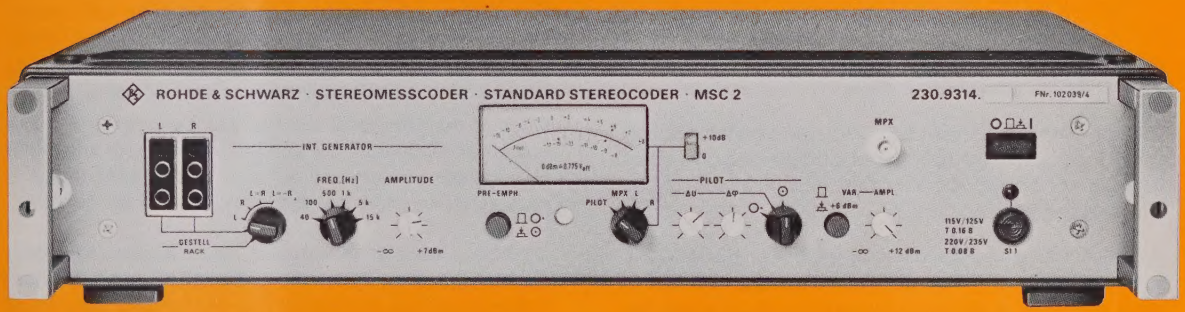
ROHDE&SCHWARZ

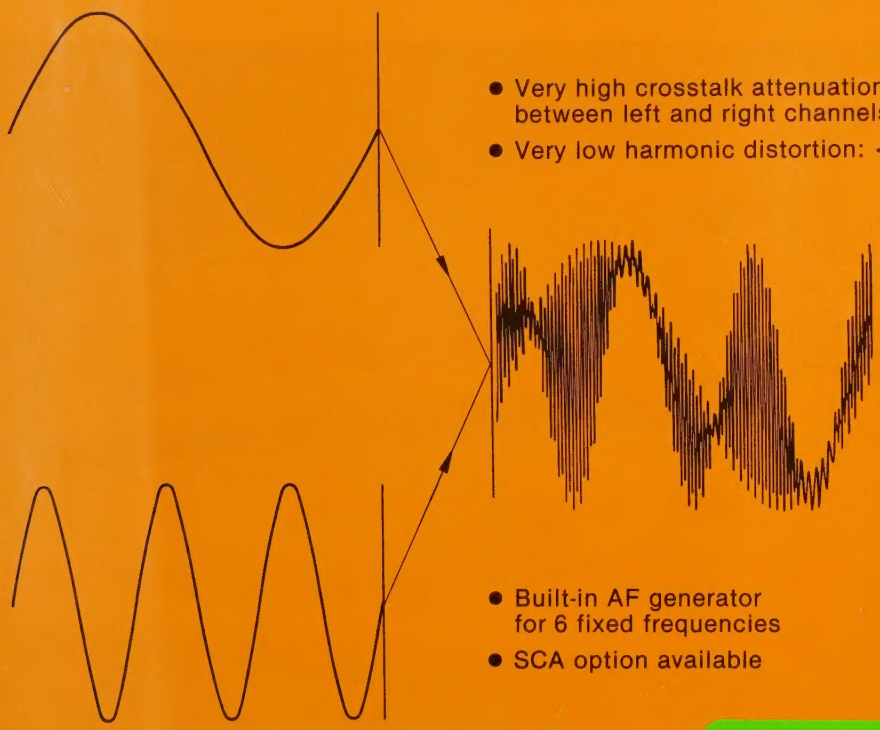
MSC 2

PRECISION STEREOCODER MSC 2

30 Hz to 15 kHz

Generation of stereophonic multiplex signal acc. to CCIR, EBU and FCC recommendations (pilot-tone system)





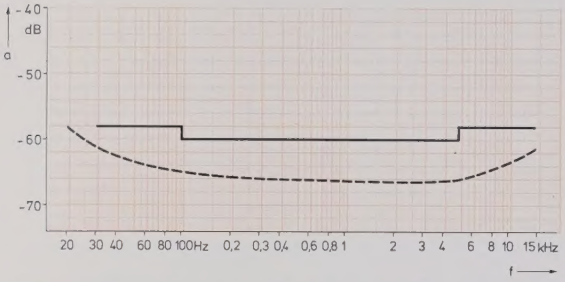
- Very high crosstalk attenuation between left and right channels: > 60 dB
- Very low harmonic distortion: < 0.1 %

- Built-in AF generator for 6 fixed frequencies
- SCA option available

MP MASTER
MA21428

CHARACTERISTICS AND USES

In the **standardized technique of stereo multiplex broadcasting,** the sound-program signals for the left and right channels are carried in the frequency range 30 Hz to 53 kHz together with a pilot tone. This stereo multiplex signal is generated in the Precision Stereocoder MSC 2 with high precision. The excellent data – for example distortion ≦0.1 % up to 12.5 dBm, unweighted S/N ratio ≧80 dB, frequency-response flatness ≦±0.15 dB and crosstalk attenuation between left and right channels >60 dB (see diagram below) – result from the new coding method employed in the MSC 2.



Stereo separation of Stereocoder MSC 2 between right and left channel; full line guaranteed and broken line typical values.

The Precision Stereocoder MSC 2 is used as **reference unit** for all measurements with stereo multiplex signals, since its data far exceed the standard specifications of the broadcasting corporations.

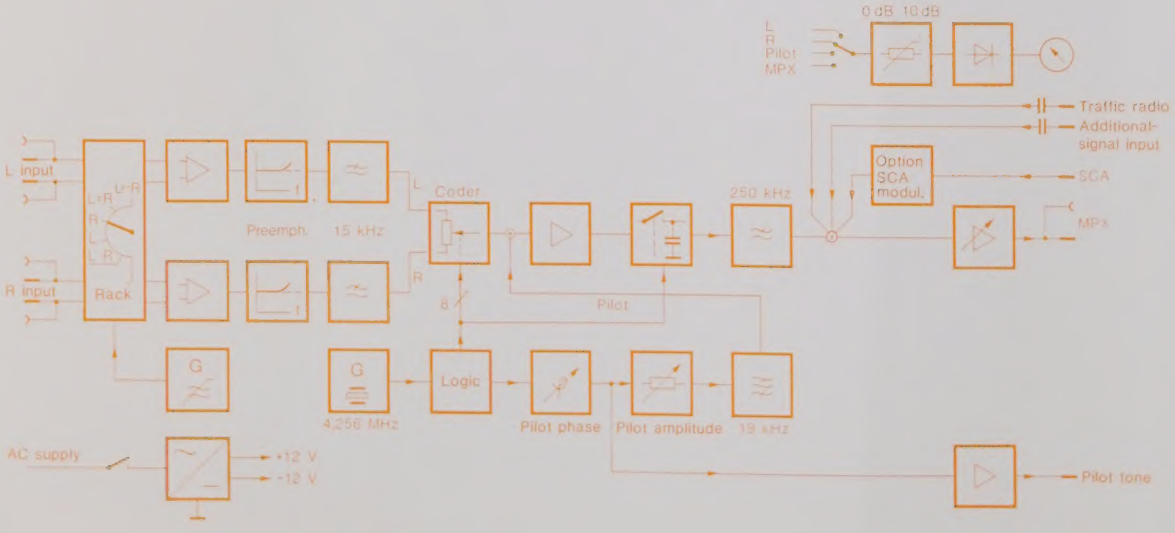
In conjunction with a stereo-signal generator, the MSC 2 is a useful instrument for the **development and production** of radio receivers. A simple measurement of crosstalk between the two AF channels gives a good idea of the main characteristics of the RF and IF sections of a receiver, without requiring elaborate frequency-response measurements; it's also a good test of the performance of the stereodecoder section. Together with a stereodecoder of similar quality, such as the MSDC 2 (see data sheet 281 051), all kinds of measurements can be made on equipment that handles and thereby possibly deteriorates multiplex signals, for instance FM transmitters, modulators, relay receivers and switchboards. In such cases it's particularly important that the inherent error of the test assembly should not falsify the measurement.

For its use as a measuring instrument, the stereocoder is fitted with an **AF generator** producing six fixed frequencies with high amplitude stability and low distortion, with the result that an external generator won't be required in most cases. The internal generator is used for the modulation modes:

L
R
L = R (mono signal)
L = -R (difference signal)

The phase and amplitude of the **pilot tone** (19 kHz) are adjustable with front-panel controls so that the characteristics of the decoder under test can be measured in any operating conditions. The amplitudes of the **AF and multiplex signals** can also be adjusted over a wide range. A peak voltmeter indicates the modulation of the coder.

An **SCA modulator** is available as an **option** for adding further signals on the multiplex signal (SCA = Subsidiary Communications Authorization = background program of inferior quality for commercial use).



Block diagram of Precision Stereocoder MSC 2

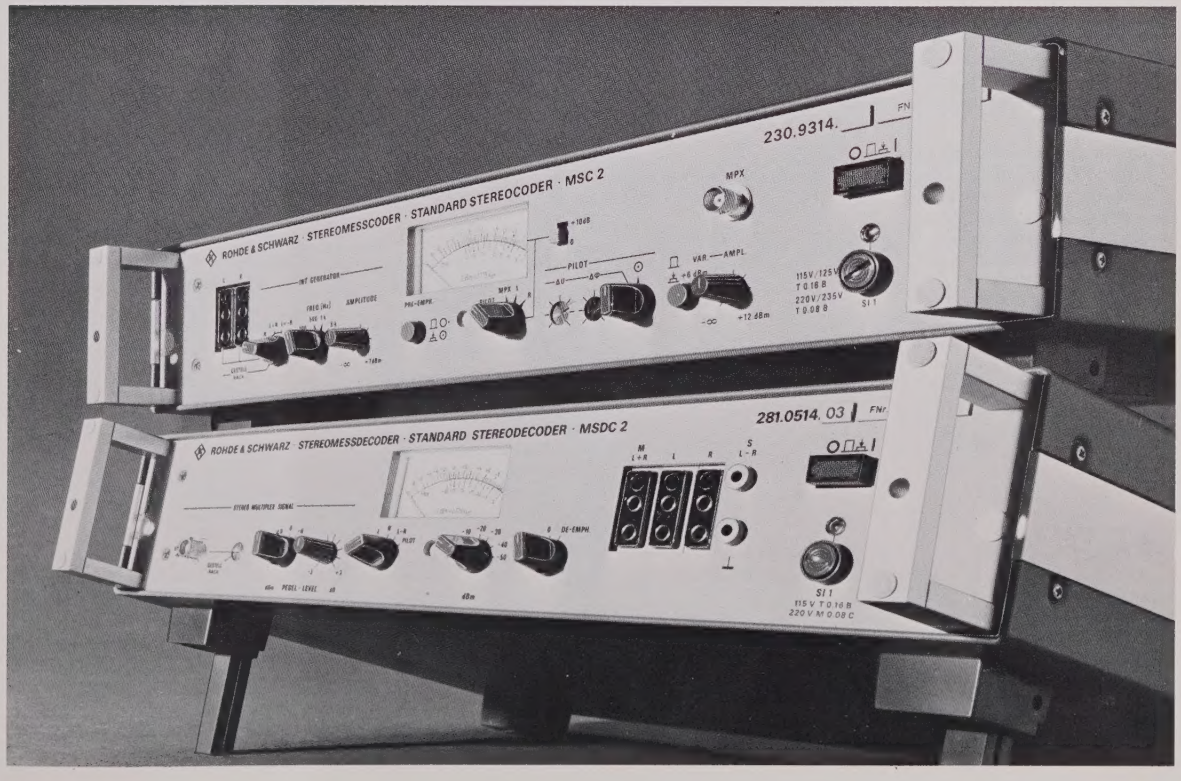
The coding methods so far employed have a common disadvantage in that a lot of effort is required to achieve the phase conditions for high channel separation when filtering out the system-related unwanted frequencies. The **coder** of the MSC 2 consequently operates on a new principle derived from the switching method. The "hard-switching" procedure at 38 kHz has been replaced by graded switching in 14 steps. In this way unwanted sidebands only occur at the 13th and 15th harmonics of the suppressed carrier. These are filtered out by a simple lowpass filter that doesn't produce any amplitude or phase distortions up to 53 kHz. Very high and stable channel separation over a wide temperature range, extremely low harmonic distortion, good S/N ratio and flat frequency response are the results of this technique.

The **AF inputs** are fitted with differential amplifiers to reliably suppress common-mode voltages caused by hum pickup for example. Following lowpass filters remove all frequencies above 18.5 kHz so that a perfect multiplex signal can be generated independently of the input voltages. Two extra signals, e. g. traffic radio or SCA channels, can be added without reaction on the multiplex signal in the frequency range between 53 kHz and about 100 kHz via two inputs (SCA modulator as option).

Except for the power supply, the entire **circuitry** of the stereocoder is contained on a single printed circuit board. Marked testpoints and a number of isolating points with shorting links simplify alignment of the circuit, as does the easy access to both sides of the circuit board. The few connections to components not mounted on the board are established with plugs and sockets for ease of maintenance.

The **SCA modulator** that's available as an option is connected to the coder board via a male connector strip; it can easily be retrofitted. This modulator consists of a sixth-order AF lowpass filter for band limiting, a preemphasis network and a high-grade frequency modulator. A phase-locked loop is provided to keep the centre frequency constant, which can be fixed in 500-Hz steps by means of coding plugs.

Precision Stereocoder MSC 2
and Precision Stereodecoder MSDC 2



SPECIFICATIONS

Inputs for L and R channels

Frequency range	30 to 15 000 Hz
Input impedance	≧ 30 kΩ, balanced
	≧ 20 kΩ, unbalanced
Nominal input level	+ 6 dBm
Overdrive limit	≧ 6.5 dB
Stopband attenuation for f ≧ 19 kHz	≧ 54 dB
Common-mode suppression for	
f < 150 Hz	≧ 66 dB
150 Hz < f < 15 kHz	≧ 44 dB

Inputs for additional signals (on rear panel)

Frequency range	53 to 100 kHz
Input impedance	≧ 2 kΩ, unbalanced
Output level	equal to input level

Output for stereo multiplex signal
(on front and rear panels, shortcircuit-proof)

Output impedance	≦ 20 Ω, unbalanced
Load impedance Z_l	≧ 300 Ω
Nominal output level,	
fixed, without pilot tone	+ 6 dBm
settable, without pilot tone	- ∞ to + 12 dBm

Linear distortions
(measured via decoder)

Frequency response variations in L and R channels, frequency range 30 Hz to 15 kHz, related to 500 Hz	≦ ± 0.15 dB
Preemphasis (disconnectible)	50 µs ± 2 % } fixed by
	75 µs ± 2 % } coding switch

Linear crosstalk

Crosstalk attenuation between M and S channels	≧ 46 dB, typ. 50 dB
Crosstalk attenuation between L and R channels (Z_l ≧ 1 kΩ),	
100 to 5000 Hz	≧ 60 dB, typ. 64 dB
30 Hz to 15 kHz	≧ 58 dB, typ. 60 dB

Nonlinear distortions
(measured via decoder)

Harmonic distortion for output levels of 6 dBm and 12 dBm	≦ 0.1 %
Intermodulation distortion acc. to DIN 45 403 at 12.5 dBm	d_2 ≦ 0.05 %
	d_3 ≦ 0.1 %

Mode suppression of multiplex signal
(relative to + 6 dBm, any AF signal)

Suppression of all frequencies above 53 kHz (without SCA signals)	≧ 60 dB
Carrier suppression	≧ 60 dB

Weighted and unweighted S/N ratio
(measured via decoder with 50-µs preemphasis and deemphasis)

Unweighted S/N ratio relative to 6 dBm output level, f = 30 Hz to 100 kHz, rms measurement	≧ 80 dB
Weighted S/N ratio relative to 6 dBm output level	
Peak measurement acc. to CCIR Rec. 468-1	≧ 76 dB
Peak measurement acc. to DIN 45 405	≧ 78 dB

AF generator

Fixed frequencies	40/100/500 Hz/ 1/5/15 kHz ± 2.5 %
Distortion	≦ 0.1 %
Level at sync output (Z_{out} ≦ 12 kΩ on rear panel)	+ 7 dBm

Pilot tone

Frequency	19 kHz ± 1 Hz
Fixed pilot tone	
Amplitude	- 9.5 dBm ± 0.2 dB
Phase (referred to 38-kHz carrier)	0° ± 0.3°
Adjustable pilot tone	
Amplitude	- 16 to - 5 dBm
Phase	± 5°
Sync output (rear), 19 kHz, mark-to-space ratio 2, Z_{out} ≦ 100 Ω	≧ 1 V_{pp}

Level indication (on panel meter)

Indication of pilot tone, MPX, L or R	
Indicating error	≦ 0.2 dB + 1.5 % fsd
Pilot-tone indication	- 17 to + 2.5 dBm
Indication of MPX, L, R	- 16 to + 18 dBm

SCA modulator

Input voltage [1]	- 10 to + 12 dBm
Frequency response variations (30 Hz to 7.5 kHz)	± 0.5 dB
Preemphasis [1]	50 µs/75 µs ± 5 %
FM deviation [1]	± 2 to ± 8 kHz
Centre frequency, crystal-controlled, coded in steps of 500 Hz	60 to 74 kHz
Distortion between 30 Hz and 7.5 kHz, deviation ≦ 7.5 kHz	≦ 1 %
Output level [1]	- 20 to 0 dBm

General data

Nominal temperature range	+ 5 to + 45 °C
Working temperature range	0 to + 55 °C
Storage temperature range	- 40 to + 70 °C
Connectors	
Stereo multiplex output	BNC female
AF inputs for L and R signals	connectors acc. to DIN 41 628
Rear inputs and outputs	30-way connector acc. to DIN 41 622
Power supply	115/125/220/235 V + 10/- 15 %, 47 to 63 Hz (10 VA)
Overall dimensions (W × H × D) and weight	
19″ cabinet model (design 80)	492 mm × 116 mm × 392 mm, 6.7 kg
19″ rackmount	483 mm × 88 mm × 384 mm, seated depth: 305 mm, 4.5 kg
Colour	front panel: grey RAL 7001 panelling: blue-grey
Panel markings	German + English
Order designation	▶ Precision Sterocoder MSC 2
19″ cabinet model	230.9314.04
19″ rackmount	230.9314.03
Panelling	085.1313.00
SCA Modulator GC 003-Z	230.9014.00

Accessories supplied

Power cable	025.2365.00
Manual	

Recommended extras

Connection panel for rackmounting	281.1591.00
Precision Stereodecoder MSDC 2	281.0514.03

[1] Can be matched within specified limits.

ROHDE&SCHWARZ GmbH & Co. KG. · D-8000 München 80 · Mühldorfstr. 15 · Tel. (089) 41 29-0 Int. + 49 89 41 29-0 · Telex 5 23 703
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MANUAL

STANDARD STEREOCODER MSC 2 230.9314

R 38114 - 1

Table of Contents

1. Characteristics

Data sheet

2. Preparation for Use and Operating Instructions 5

2.1 Legend for Fig. 1 5
2.2 Preparation for Use 7
2.2.1 Adjusting to Local AC Supply 7
2.2.2 Adjusting the Preemphasis 7
2.2.3 Auxiliary Inputs 7
2.2.4 Fitting the SCA Modulator (option) 7
2.3 Brief Operating Instructions 7
2.4 Operation 8
2.4.1 L and R Inputs 8
2.4.2 Auxiliary Inputs 9
2.4.3 MPX Outputs 9
2.4.4 Auxiliary Outputs 9
2.4.5 Pilot Tone 10

3. Maintenance 11

3.1 Routine Maintenance 11
3.2 Checking the Rated Specifications 11
3.2.1 Required Measuring Equipment 11
3.2.2 Measurements 11

4. Circuit Description 14

4.1 L and R Channels 14
4.2 Coder 14
4.3 Summing Amplifier, MPX Lowpass Filter and Output Amplifier 15
4.4 Pilot-frequency Processing 16
4.5 AF Generator 17
4.6 Indication 18
4.7 Power Supply 18

5. Repairs 19

5.1 Required Measuring Equipment 19
5.2 Trouble-shooting 19

5.2.1 Power Supply 19
5.2.2 AF Generator, Input Amplifier and L/R Indication 19
5.2.3 Generation and Processing of Pilot Tone 19
5.2.4 Coding and Output Amplifier 20
5.3 Adjustments 20
5.3.1 Supply Voltages 20
5.3.2 AF Generator 20
5.3.3 Indication 20
5.3.4 Channels L and R 21
5.3.5 MPX Lowpass Filter and Output Amplifier 22
5.3.6 Pilot-tone Generation 22
5.3.7 Crosstalk L/R 24
5.3.8 Crosstalk M/S 24

Fig. 1 Front- and rear-panel controls
Fig. 2 Interior view
Fig. 3 Pin assignment
Fig. 4 Preemphasis
Fig. 5 Signal level diagram
Fig. 6 Oscillograms Pilot-tone generation
Fig. 7 Oscillograms (Coder circuitry)

Parts Lists

Drawings and Diagrams

2. Preparation for Use and Operating Instructions

2.1 Legend for Fig. 1

Item	Panel engravings	Function
1	L R	Inputs of the L and R channels; they can be switched on with switch 2.
2	RACK - L R L = R L = -R INT GENERATOR	Input selector for: rack input (ST101.0abc and .9abc), front input 1, internally generated test frequencies which are selected with switch 3 and whose level 4 is adjustable.
3	FREQ. [Hz] 40-100-500- 1k-5k-15k	Switch for setting the frequency of the internal AF generator
4	AMPLITUDE -∞ +7 dBm	Knob for adjusting the level of the internal AF generator
5	PRE-EMPH.	Pushbutton for switching the preemphasis on and off (50 or 75 µs can be selected internally)
6	-	Meter with the following two scales (0 dBm = 0.775 V_{rms}): -15 to +8 dBm (for L, R and MPX) (mark at nominal level +6 dBm) -17 to -8 dBm PILOT (mark at nominal levels -9.5 dBm and -15 dBm) sensitivity (+10 dB) can be changed with switch 8.
7	PILOT/MPX/L/R	Selector for type of indication on meter 6
8	0 +10 dB	Sensitivity switch for meter 6 Position "0": direct reading Position "+10 dB": 10 dB must be added to reading

Item	Panel engravings	Function
9	ΔU ---- ┐ PILOT	Level control for pilot tone
10	Δφ --- ┤ PILOT	Phase control for pilot tone
11	◯• – ┤ – ⊙ PILOT	Mode selector for pilot tone with the following positions: ◯• : no pilot tone in the MPX signal – : pilot tone is adjustable with 9 (amplitude) and 10 (phase) ⊙ : pilot tone with standard level available in the MPX signal
12	VAR. +6 dBm ┐ MPX	Pushbutton for controlling the amplitude of the MPX signal Button pushed (+6 dBm): standard level Button not pushed: level adjustable with potentiometer 13
13	AMPL. - ∞ +12 dBm ┘ MPX	Level control for the MPX signal if button 12 (VAR) pushed
14	MPX ┘ MPX	Front output (BNC socket) for the multiplex signal. This output is parallel-connected to the rear output (ST101.7abc).
15		Power switch with pilot lamp
16	115 V/125 V T 0.16 B 220 V/235 V T 0.08 B Si1	Power fuse, must match AC supply voltage as shown.
17	ST10 47 - 63 Hz	Power connector with label indicating the selected AC supply voltage.
18	ST101	Male connector strip with pin assignment according to Fig. 3 (AF inputs L, R and SCA channel; outputs for MPX, pilot and AF generators).

2.2 Preparation for Use

See Fig. 2

2.2.1 Adjusting to Local AC Supply

The MSC 2 is factory-adjusted for 220 V. When switching over to another AC supply voltage, change the soldering connections of the corresponding terminal on the soldering-lug strip of the power transformer. This soldering-lug strip is located below the cover, on which a diagram of the wiring is printed, and is accessible from above after having removed the stereocoder from the rack. Check the values of the fuse Si1 (16) and, if necessary, insert the correct value. Change the voltage value on the label below the power connector (17) accordingly.

2.2.2 Adjusting the Preemphasis

Select the preemphasis, 50 µs or 75 µs, by means of the links BR101 and BR103 according to the panel engraving for the channels L and R (set in factory to 50 µs).

2.2.3 Auxiliary Inputs

If an auxiliary input is required, remove the corresponding link which mutes the input (links inserted in factory).

Input	Link to be removed
ST101.4a - 4c (⊥)	BR108
ST101.4b - 4c (⊥)	BR107

2.2.4 Fitting the SCA Modulator (option)

See separate manual and specified codings.

Build the modulator into ST105. Remove the link BR109 to enable the output. The AF input ST101.5a-5c (⊥) is at the rear of the set.

2.3 Brief Operating Instructions

The following switch positions are required for generating a standard coded signal:

- Input selector 2 to the position corresponding to the front or rear inputs in use.
- PRE-EMPH. button 5 pushed, i.e. preemphasis switched on.
- PILOT switch 11 to ⊙ (on), i.e. standard pilot level.
- VAR. button 12 to "+6 dBm", i.e. fixed output level.
- Indication selector 7 to the position corresponding to the level adjustment of the sound signals L and R on the generator in compliance with the indication on meter 6.

2.4 Operation

2.4.1 L and R Inputs

Connections

The sound sources are applied to the inputs 1 or, if the stereocoder is rack-mounted, to the connector strip 18 (contacts L = 9abc, R = 0abc; see Fig. 3). The inputs may be balanced or unbalanced. The input voltages must be free from any DC component.

Input selection

Switch 2 permits the selection between the inputs 1 and the male connector strip 18. The inputs are disconnected in all the other positions of switch 2.

AF generator

In the positions L, R, L = R and L = -R of switch 2, the built-in AF generator is connected to the inputs corresponding to the switch labelling. The frequency is set with switch 3 and the amplitude with knob 4.

Preemphasis

The preemphasis can be switched on and off with the pushbutton 5.
In normal operation, the button is pushed in, i.e. the preemphasis is switched on. It can also be changed over between 75 µs and 50 µs by changing links provided in the set.

Note: A preemphasis of 50 µs increases the voltage by 13.6 dBm at 15 kHz. Thus the maximum input voltage (AF) should be no more than -1 dBm, in order not to exceed the overdrive limit of +12.5 dBm. In the case of 75 µs preemphasis, the maximum input voltage is -4.5 dBm.

Signal indication

The level of the left or right channel can be observed on the upper scale of meter 6 with switch 7 in position "L" or "R". The measurement range can be extended by +10 dB with slide switch 8.

The level of the AF signals must be adjusted on the audio source itself, although when using the built-in AF generator level adjustment can be carried out directly with knob 4.

2.4.2 Auxiliary Inputs

The auxiliary inputs 18 at the rear of the unit, for the SCA modulator (AF at ST105.5ac) and for the additional signals (at ST105.4ac and 4bc), cannot be varied but can be switched on and off by changing the internal links.

2.4.3 MPX Outputs

Connections

The coded signal (MPX or multiplex signal) is available in unbalanced form at the front output 14 and the rear connector strip 18 (contacts ST101.7ac) which are connected in parallel.

Level adjustment

If button 12 is pushed (position "+6 dB"), the overall gain is fixed. In position "VAR.", however, the output level can be adjusted up to +12 dBm by means of the level control "AMPL." 13. This level adjustment affects all the signal components equally, i.e. pilot tone, SCA signal and additional channels.

Signal indication

In position "MPX" of the indication selector switch 7, it is possible to observe the output level on the upper scale of meter 6. The measurement range can be extended by +10 dB with slide switch 8. The peak value of the complete signal (MPX + pilot + SCA + additional channels) is indicated.

2.4.4 Auxiliary Outputs

Two outputs are available for testing, particularly for triggering an oscilloscope.

AF generator

In the positions L, R, L = R and L = -R of the input selector switch 2, the built-in AF generator is in operation and delivers a voltage of about +7 dBm

(into Z_{out} = approx. 10 kΩ) to the rear connector strip 18 (contact ST101.8ac).

Pilot tone

A constant 19-kHz squarewave voltage of V_{pp} = approx. 1 V (Z_{out} < 100 Ω), whose phase is the same as that of the pilot tone in the multiplex signal, is present at the male connector strip 18 (contact ST101.3bc).

With the mode selector 11 set to the on-position, the phase is internally coupled to the 38-kHz subcarrier, while in the positions "off" and "$\Delta\varphi$ ΔU" the phase of the squarewave voltage is adjustable with the phase control 10.

2.4.5 Pilot Tone

Operating modes

Switch 11 selects the following operating modes for the pilot tone:

- "on" = ⊙ : 19-kHz pilot tone with standardized amplitude and phase in the multiplex signal
- "off" = ◯• : pilot tone switched off (available at sync output ST105.3abc with adjustable phase)
- ΔU - $\Delta\varphi$: pilot tone with adjustable amplitude (control 9 "ΔU") and adjustable phase (control 10 "$\Delta\varphi$") in the multiplex signal. Pilot amplitude adjustable in the range -16 dBm to -5 dBm compared with the +6 dBm level of the multiplex signal. Pilot phase adjustable in the range -5° to $+5^{\circ}$ compared with the standardized phase with respect to the 38-kHz subcarrier.

Indication

If the indication selector 7 is in position PILOT, the pilot level can be read on the lower scale of meter 6. The indicated value applies to an output level of +6 dBm of the MPX signal (nominal value: -9.5 dBm).

3. Maintenance

3.1 Routine Maintenance

Regular maintenance is not required. However, it is recommended that the unit be checked occasionally against the specifications according to section 3.2.

3.2 Checking the Rated Specifications

3.2.1 Required Measuring Equipment

DC voltmeter		
AF voltmeter	10 Hz to 100 kHz -70 to +12.5 dBm; R_{in} > 1 kΩ	SUN 2/U
AF generator	10 Hz to 100 kHz +12.5 dBm, max.; Z_{out} < 30 Ω	
Oscilloscope	bandwidth > 10 MHz; high overload capability for measurements of crosstalk in multiplex signal	TEKTRONIX
AF analyzer or selective AF voltmeter	bandwidth < 100 Hz; sensitivity better than -70 dBm	FAT 2
Stereodecoder		MSDC 2
Psophometer	(contained in SUN 2/U)	
Distortion meter		e.g. LEA or HP

3.2.2 Measurements

Refer to the data sheet for the required results.

Checking the amplifier characteristics

Apply a signal to the L and R input (BU10) at f = 30 Hz to 15 kHz and with the specified input levels. Measure at the decoder outputs (DEC.) and the MPX output (BU20) with an AF voltmeter and the panel meter (J1).

Input	Measure at	Measured value	Remarks
Coder circuit	outputs		
500 Hz/+6 dBm			
L = R	DEC. L	+6 dBm	Pilot "on"
L = R	DEC. R	+6 dBm	
L = -R	DEC. L	+6 dBm	
L = -R	DEC. R	+6 dBm	
L (R = 0)	DEC. L	+6 dBm	
L (R = 0)	DEC. R	(< -54 dBm)	Value with ideal decoder
R (L = 0)	DEC. L	(< -54 dBm)	Value with ideal decoder
R (L = 0)	DEC. R	+6 dBm	
Frequency response	outputs		referred to 500 Hz
30 Hz - 15 kHz/+6 dBm			
L = R	BU20 MPX	< +0.15 dB	
L = R	DEC. L	< ±0.15 dB	Preemph. "off" (deemph. in decoder "off")
L = R	DEC. R		
Preemphasis	outputs		referred to 500 Hz
500 Hz/15 kHz/-6 dBm			
L = R	DEC. L and R	+13.66 dB (50 µs) +17.07 dB (75 µs) (±0.2 dB)	Preemph. "on" (deemph. in decoder "off")
Pilot level	output		
L = 0, R = 0	BU20 MPX	-9.5 dBm	Pilot "on" or "ΔφΔU"
	meter J1 MPX	-9.5 dBm	(upper scale)
Indication	meter		
500 Hz/+6 dBm			+) Pilot "off"
L = R	J1- L	+6 dBm	upper scale
L = R	J1- R	+6 dBm	upper scale
L = R	J1- MPX	+6 dBm +)	upper scale
L = R	J1- Pilot	-9.5 dBm	lower scale

Checking the crosstalk

Measure at the MPX output with an oscilloscope with high overload capability (for L/R crosstalk checks) and with a selective AF voltmeter (for M/S) according to sections 5.3.7 and 5.3.8.

Checking the distortion

Apply a signal to the L or R input with a level of +6 dBm or +12.5 dBm at frequencies of 30 Hz, 500 Hz and 5 kHz. Measure the harmonics at the corresponding output of the decoder.

Checking the intermodulation distortion acc. to DIN 45403

Apply a signal to the L or R input via two identical decoupling resistors of about 18 kΩ using two generators. Frequencies f1 = 13 kHz and f2 = 14 kHz. Adjust the same level on both generators so that the meter J1 indicates "+6 dBm" or "+12.5 dBm". Measure the amplitudes at the corresponding decoder outputs:

f1:	V1 (13 kHz)	f2:	V2 (14 kHz)
2f1 - f2:	S1 (12 kHz)	2f2 - f1:	S2 (15 kHz)
f2 - f1:	D (1 kHz)		

If the distortion is < 10%, the intermodulation distortion components according to DIN 45403 may be calculated as follows:

$$d_2 = \frac{D}{V1 + V2} \qquad d_3 = \frac{S1 + S2}{V1 + V2}$$

Checking the carrier suppression

Apply a signal to both inputs: L = R = +6 dBm at 500 Hz. Measure at the MPX output (BU20) at 38 kHz.

Checking the weighted and unweighted noise voltages

Measure at the decoder output with the psophometer, the L and R inputs of the MSC 2 being short-circuited and the preemphasis and deemphasis switched on.

4. Circuit Description

4.1 L and R Channels

See circuit diagram 230.9314 S, sheet 1

The signals from the rear input (ST101.9abc and 0abc) or the front input (BU10), which are selected with switch S101, or the test signal from the built-in AF generator are taken to the two identical amplifier paths.

The first stage B101 (B104) is a differential amplifier whose inputs are protected against overvoltage by means of diodes. The common-mode rejection is optimized with R102 (R122). The preemphasis section, which has links to set the time constants and can be switched off with S103, is followed by the buffer B102 (B105). The Cauer-type lowpass filter L101 to L104 (L105 to L108) suppresses frequencies in the range above 15 kHz; it has notches at 38.8, 19.2, 18.1 and 23.1 kHz.

After inversion in B103 (B106), the signals are taken to the resistor chain of the coder (lines C and F in circuit diagram). Correction signals for improving the crosstalk are also required (lines A, B, D, E).

4.2 Coder

See circuit diagram 230.9314 S, sheet 2, and oscillograms, sheet 6a.

The coder operates on a principle which is based on the switching technique. The "hard-switching" procedure at 38 kHz is replaced by graded switching in 14 steps. In this way, unwanted sidebands only occur at the 13th harmonic and can be filtered out by a simple lowpass filter.

"Soft switching" is performed by the resistor chain R185 to R199 between the signal lines "-L" (line C in circuit diagram) and "-R" (line F) and by the field-effect transistors T106 to T114 that are switched through sequentially. The correction signals "-L" and "-R" (lines D and E) improve the coding at the moment of subcarrier zero crossing.

The switching pulses for the field-effect transistors are generated in the shift register B113/B114 and delivered in the correct sequence by the AND gates B111/B112 (see oscillograms Fig. 6a). The switching sequence of the 38-kHz subcarrier frequency within each cycle starts with T109 towards T106, is reversed to T114 via T109 and terminates with T111.

4.3 Summing Amplifier, MPX Lowpass Filter and Output Amplifier

See circuit diagram 230.9314 S, sheets 2 and 3.

The summing amplifier consists of the input stage designed as a differential amplifier comprising T115 and T116 and of the driver stage T117 whose collector resistor is the constant current source T119 increasing the open-loop gain. The operating point of the complementary output stage T118/T121 is determined by the emitter resistors R236 and R237 together with the diodes G1 127 and G1 128. The negative feedback is adjustable with R231. The following signals are summed at the amplifier input with the correct relative levels:

a) Sum signal $M = \frac{L + R}{2}$ and difference signals $S = \frac{L - R}{2}$ superimposed on a carrier and delivered by the coder (see section 4.2).

b) Pilot tone P (19 kHz) obtained from the pilot generator circuit (see section 4.4).

c) Correction signals for reducing the crosstalk via R216 and C148 as well as R217 and C149 (lines A and B).

Interfering switching spikes (532 kHz) from the coder are eliminated by the sample & hold circuit T122/C153. The emitter follower T123, whose resistor is designed as a constant current source comprising T124, feeds the MPX low-pass filter.

The MPX lowpass filter using L111 and L112 is a Cauer-type filter with two attenuation peaks at 768 kHz and 498 kHz. The harmonics of the subcarrier - which theoretically may be present - are sufficiently suppressed without deteriorating the phase and amplitude response up to 53 kHz.

The output amplifier is made up of the two stages T132 to T135 and T136 to T138. The first stage operates as a summing circuit for the following signals:

a) MPX signal (coded signal including the pilot tone).

b) SCA signal, if the option "SCA modulator" is used.
This signal from the input ST101.5a (c) is frequency-modulated and has a carrier in the range 60 to 74 kHz whose centre frequency is referenced to the pilot tone.

c) Additional signals from the inputs ST101.4a (c) and ST101.4b (c).

In the switch position "+6 dB" (S105), the stage gain is approximately 6 dB for the multiplex signal and approximately 0 dB for the other signals. In position VAR., the gain is increased by about 6 dB.

The second stage of the output amplifier consists of the emitter follower T136 whose emitter resistor is represented by a controlled constant current source made up of T137 and T138. The multiplex signal is coupled out without the DC component via the electrolytic capacitors C186/C187, which are connected back-to-back, and then taken to the parallel-connected outputs ST101.7a (c) and ST107. The source impedance is basically the resistance of R303.

4.4 Pilot-frequency Processing

See circuit diagram 230.9314 S, sheet 2, and oscillograms in Fig. 6b.

The crystal oscillator Q101/B109 III delivers the 4.256-MHz base frequency (= 2 x 8 x 14 x 38 kHz) via the inverters B109 I and II. After a division of 8 : 1 in B110 I, the 532-kHz clock frequency is available for the shift register. From this frequency, the monostable T125/T126 obtains the slightly delayed sampling pulses for the sample & hold circuit T122 in the summing amplifier.

The stages 1 to 14 in the 16-digit shift register B113/B114 are connected via B114.12-G1 114-B113.7 so as to form a ring. One bit continuously cycles with the clock frequency and thus causes a "high" level at the output assigned to the corresponding digit. All other outputs that are not activated are at "low". If there is no bit circulating, it is fed in by G1 115 to 123 via B109 IV and G1 113. The reset line B114.13 (13th digit) which is run to B113.6 + .14 and B114.6 erases the contents of the stages 1 to 12 before the bit is transferred to the first stage, thus avoiding the circulation of two or more bits.

Pilot-tone generation is carried out in two different ways, depending on the pilot mode selected with switch S104; the shift register acts as a 14 : 1 divider.

The signal from the 8th shift register stage (B113.2) is used for the pilot tone with a fixed phase. It is applied to the 2 : 1 divider B110 II which produces a symmetrical squarewave at 19 kHz. For the pilot tone with adjustable phase, the signal from the 6th shift register stage (B113.12) triggers

the monostable B115. Its delay can be adjusted between 2 µs and 4 µs, approximately, by means of R271 "Δf", corresponding to a phase shift of about 14° (> 10°) referred to the pilot tone. The divider B110 II is again used to generate the 19-kHz squarewave voltage.

This squarewave voltage performs several functions. It synchronizes the phase control loop in the SCA modulator option (see separate manual). After limiting with G1 129/G1 131, the emitter follower T131 feeds the pilot output ST101.3b (c) at the rear of the coder. The differential amplifier T128/T129 delivers the sine-shaped pilot tone to the summing amplifier via the 19-kHz bandpass filter (L113 to L114) and the emitter follower T127. The pilot amplitude is determined by the current of the current switch T128/T129, depending on the pilot mode selected with S104. It is preset with R268 in the pilot mode "on" and adjustable by means of R266 "ΔU" on the front panel in the variable pilot tone mode; there is no output in the pilot mode "off".

4.5 AF Generator

See circuit diagram 230.9314 S, sheet 1

The AF generator with B107 is designed as a Wien bridge oscillator which operates when input selector S101 is in the positions L, R, L = R and L = -R of the input selector S101. The frequency-determining section is formed by the series-connected RC highpass and lowpass filters. The capacitors C139 and C120 are fixed, whilst the resistors R147 to R153 - in parallel with R154/C139 and R141 to R146 and in series with C120 - are switchable with S102 as a function of the desired frequency. The AF voltage can be adjusted between 0 and about 1.7 V (+7 dBm, max.) with R158 and indicated on the panel meter in the switch positions L and/or R.

The following operating modes can be obtained by turning input selector S101:

L: a signal is only applied to the left channel, whereas the input of the right channel is connected to 0 V (chassis).

R: a signal is only applied to the right channel.

L = R: both channels are driven in phase with the same level.

L = -R: both channels are driven out of phase with the same level.

The amplitude is stabilized with the control loop B108 I + II and T101. After peak rectification with G1 111, the buffer B108 I feeds amplifier

B108 II via R167. The reference is a constant current flowing in the opposite direction via R168. G1 112 temperature-compensates G1 111. The field-effect transistor T101 in series with R157 is connected in parallel with R155. The output voltage of B108 II acts on the feedback circuit R156/R155 until the nominal value of the oscillator voltage is achieved.

4.6 Indication

See circuit diagram 230.9314 S, sheet 1.

The checkpoint selector S106 selects the signal to be indicated and can be set to the positions L and R for the AF input signal, MPX for the coded output signal and PILOT for indication of the pilot component in the multiplex signal. The indication sensitivity can be increased by disconnecting the 10-dB attenuator R181/R182 with S20.

The half-wave peak rectifier circuit using T102 to T105 evaluates the negative half-waves referred to the input signal L or R. The differential amplifier T104/T105 delivers the signal for the transistor T103 which operates as a rectifier. Capacitor C144 is charged to the peak value. The FET impedance transformer T102 delivers the indicating voltage for meter J10 while offering a minimal load for the charging circuit. The feedback via R175 adjusts the operating point of the differential amplifier so that only the peaks exceed the adjusted level (for a constant-level input it is exceeded for only short periods) and recharge the capacitor immediately. The discharge time constant is fixed by R176 and is around 10 seconds.

4.7 Power Supply

See circuit diagrams 230.8518 S, sheet 3, and 230.8918 S.

The AC supply voltage passes from the rear connector ST10 through the noise filter X10, the power switch S10 and the fuse S11 to the power transformer. The two secondary windings feed the control circuit Y10. Lamp RL10 indicates that the unit is switched on.

The subassembly Y10 is made up of two identical control sections for the output voltages, +12 V and -12 V. The feedback amplifier B401 (B402) controls the series transistor T401 (T402); resistor R401 (R402) limits the short-circuit current under fault conditions. B401 compares the reference voltage of G1 404 (+6.2 V, approx.) with that portion of the +12-V output voltage which is tapped off at R406. The diode G1 403 delivers the operating voltage for B401. The second feedback amplifier B402 is fed with +12 V and -12 V.

5. Repairs

5.1 Required Measuring Equipment

See section 3.2.1

5.2 Trouble-shooting

Prior to electrical testing, the boards and the components should be checked for visible defects. Then trace the faults through the following stages (see signal level diagram in Fig. 5):

* power supply
* AF generator, input amplifier, L/R indication
* generation and processing of pilot-tone
* coder circuitry, output amplifier
* SCA modulator (see separate manual)

5.2.1 Power Supply

Check the supply voltages +12 V at K70.7 and -12 V at K70.1.

5.2.2 AF Generator, Input Amplifier and L/R Indication

Set the input selector to position R = L and check the level with the indication selector in positions R and L. If the level control AMPL. is turned fully clockwise, the indication must be +7 dBm in both channels. If there is a problem, carry out further checks according to the signal level diagram in Fig. 5 (test points MP 101 to 106, links 102 to 103).

5.2.3 Generation and Processing of Pilot Tone

Set the indication selector to PILOT and check for the correct pilot level on the lower scale. The nominal level is indicated with the pilot mode selector (S104) set to "on" and "$\Delta\varphi\,\Delta U$"; there is no indication when the pilot mode selector is in position "off". If there is a problem, check with an oscilloscope according to Fig. 5 (test points MP 109 and MP 111 and specified pins of the ICs). Check the frequency with a counter (test point MP 111 or connector ST101.3b).

5.2.4 Coding and Output Amplifier

Set the input selector to position MPX and the pilot mode selector (S104) to "off": no SCA or auxiliary signal.

Input selector (S101)	Indication (with S106 set to MPX)
L R L = R L = -R	+6 dBm

Oscillogram as in Fig. 7a (triggering with pilot tone).

5.3 Adjustments

5.3.1 Supply Voltages

Adjust R406 for +12 V ±50 mV at ST402.6/7.
Adjust R411 for -12 V ±50 mV at ST402.1/2.
(chassis: ST402.4/5)

5.3.2 AF Generator

Set the input selector (S101) to position L or R.
Measure at B107, pin 6, with distortion meter, voltmeter and frequency counter.
Adjust R161 for minimum distortion at 1 kHz (S102) and, if necessary, reduce R165 (minimum value: 68 Ω). Distortion $\leq$ 0.1%.
Check the AF level for +7 to +7.5 dBm at all frequencies.
Check the frequencies; permissible deviation: < ±2% from the selected value.

5.3.3 Indication

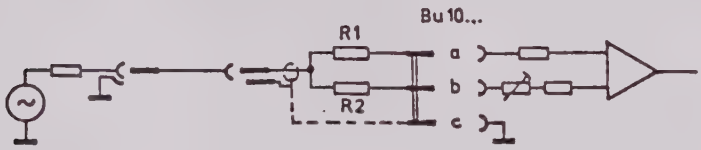
Adjust the mechanical zero of the meter with the MSC 2 switched off.
Adjust the electrical zero (without AF signal) by means of R177.
Adjust R174 with 500-Hz AF signal in the left channel.
Set the sensitivity switch (S20) to "0 dB" and the indication selector to "L". Check the level at test point MP103: should be +6 dBm ±0.05 dB. Adjust for +6-dBm indication on the upper scale.

Check the sensitivity switch: when switching from "0 dB" to "+10 dB", the indication must drop from +6 dBm to -4 dBm.

5.3.4 Channels L and R

Common-mode rejection

Apply a signal to the L or R input (BU10 on front panel) at f = 100 Hz and a generator level of +6 dBm, using the following adapter.



R1 = R2 = 300 Ω
selected to obtain a resistance difference < 0.05%

Adjust for minimum at test point MP 101 with R102 (left channel).
Adjust for minimum at test point MP 104 with R122 (right channel).

15-kHz lowpass filters

Apply a signal to the L or R input (BU10 on front panel) with a level of about +6 dBm at the specified pole frequencies (±0.5%) and adjust for minimum at test point MP...

Pole frequency	Left channel		Right channel	
38.8 kHz	L101	test point MP 103	L105	test point MP 106
19.2 kHz	L102		L106	
18.1 kHz	L103		L107	
23.1 kHz	L104		L108	

Carrier suppression

Measure the DC voltage (offset at B103 and B104).
Set link BR102 to L and link BR104 to R; do not apply an AF signal.
Adjust R116 for 0 V ±0.5 mV at test point MP 103.
Adjust R136 for 0 V ±0.5 mV at test point MP 106.

5.3.5 MPX Lowpass Filter and Output Amplifier

MPX lowpass filter

Open the link BR105 and apply a signal to BR105.M at the specified frequencies (±0.5%). Measure at the MPX output (BU20).
Adjust L111 for minimum at 768 kHz (approx. 20 x 38 kHz).
Adjust L112 for minimum at 498 kHz (approx. 13 x 38 kHz).

Output amplifier

Feed in and measure as mentioned above, but at approximately 1 kHz and with a load of 600 Ω. Adjust the level in such a manner that +6 dBm is obtained at test point MP 112.
Set the multiplex amplitude switch (S105) to "+6 dBm"; this must result in an output voltage of +6 dBm at BU20 and in an indication of +6 dBm on the panel meter (S106 to MPX).
Set the multiplex amplitude switch (S105) to VAR., the output voltage should then be adjustable up to +12 dBm at BU20.

Auxiliary inputs

Apply a signal to the specified points at approximately 60 kHz and +6 dBm. Measure at the MPX output BU20 with switch S105 in position "+6 dB".
ST105.7 (BR109 removed)
ST101.4a (c) (BR108 removed)
ST101.4b (c) (BR107 removed)
In all three cases, the output voltage must be +6 dBm ±0.5 dB.

Level adjustment

Apply L or R = +6 dBm at 500 Hz. Switch the pilot off. Set switch S105 to "+6 dBm". Measure at BU20 with a load of 600 Ω.
Adjust to +6 dBm (±0.1 dB) with R231. Check with the meter J1 and in switch position MPX. Select VAR. AMPL. and adjust up to +12 dBm with R135.

5.3.6 Pilot-tone Generation

Crystal oscillator

Measure the frequency at test point MP 109.
Adjust to 4.256 MHz $\pm 1 \times 10^{-5}$ with C159.

Pilot indication

Set the indication selector (S106) to PILOT and the pilot mode selector (S104) to "on". Adjust for an indication of -9.5 dBm on the lower scale by means of R268.

Pilot amplitude

Set the indication selector (S106) to PILOT, do not apply an AF signal. Measure at the multiplex output (BU20). Adjust for pilot indication by means of R268.

Set the pilot mode selector (S104) to "on".
Adjust for a pilot amplitude of -9.5 dBm ±0.05 dB with R250.

Set the pilot mode selector (S104) to "$\Delta\varphi$ ΔU".
Check the setting range available: should be about -4 dBm to -17 dBm with R266 "ΔU".
Check the indication on the meter.

Pilot phase

Set the indication selector (S106) to "L" or "R", the input selector (S101) to "L = -R" and the frequency selector (S102) to "500 Hz". Adjust the AF level to approximately -16 dBm with R158 AMPL., MPX = +6 dBm. Measure at the multiplex output with an oscilloscope; trigger externally with pilot from ST101.3b. See Figs. 7b and 7c which show the oscillograms for the pure pilot tone and for the pilot tone with difference signal, the sensitivity setting being the same for both pilot tones. The voltage V_{PH} referred to the pilot amplitude V_{19} has the following relationship with the phase angle φ in degrees:

$$\varphi^{\circ} = \frac{V_{PH}}{V_{19}} \times \frac{180}{\pi}$$ (φ in degrees is referred to the 19-kHz pilot frequency)

Pilot mode selector (S106) set to "on":
measure the voltage V_{PH} and adjust for minimum phase with R274.
$V_{PH} \leqq 3$ mV ($\triangleq \leqq 0.2^{\circ}$)

Pilot mode selector (S106) set to "$\Delta\varphi$ ΔU":
measure the voltage V_{PH} and check the setting range available when using R271 "$\Delta\varphi$ ". V_{PH} should be varied symmetrically by ±75 mV. This corresponds to a phase setting range of approximately $\pm 5^{\circ}$ referred to the above-mentioned levels (AF voltage -16 dBm, pilot level -9.5 dBm). If the setting range is extremely asymmetrical, vary R272 so that $V_{PH} < 10$ mV when R271 is at its mid-position.

Distortion of 38-kHz subcarrier

Plug links BR102 and BR104 into T; do not apply an AF signal; set the pilot mode selector (S104) to "off".

During this measurement, the signals -L and -R are replaced by DC voltages at the resistor chain (approx. -4.3 V at test point MP 103, approx. +4.3 V at test point MP 106). The sequential switching-through followed by the sampling and filtering process generates a 38-kHz voltage with a sine-shaped characteristic in the ideal case. Any errors which may occur in the resistor network or the switching transistors will result in distortion. Measure the distortion at the multiplex output: $k \leq 0.5\%$.

5.3.7 Crosstalk L/R

Set the pilot mode selector (S104) to "off". Switch off the preemphasis (S103). Measure at the multiplex output (BU20) with an oscilloscope with high overload capability. Trigger with the AF signal from ST101.8a. Drive one channel with +6 dBm and measure the deviation from the zero line, i.e. the crosstalk (see Fig. 7d). Sequence of adjustments: R217, R216, C148, C149.

Input (S101/S102)	100 Hz	15 kHz
Channel L	R217	C149
Channel R	R216	C148
Crosstalk attenuation	> 70 dB	> 64 dB

5.3.8 Crosstalk M/S

Switch off the pilot mode (S104) and the preemphasis (S103).
Measure at the multiplex output (BU20) with a selective AF voltmeter. Drive both channels simultaneously with +6 dBm. The attenuation referred to the input level must be attained at the specified test frequencies.

Feed-in (S101)	(S102)	Test frequency	Adjustment	Attenuation
L = R	1 kHz	37 kHz, 39 kHz	R118	> 60 dB
L = R	15 kHz	23 kHz, 53 kHz	L101, L105, alternately	> 52 dB
L = -R	15 kHz	15 kHz	checking	> 48 dB

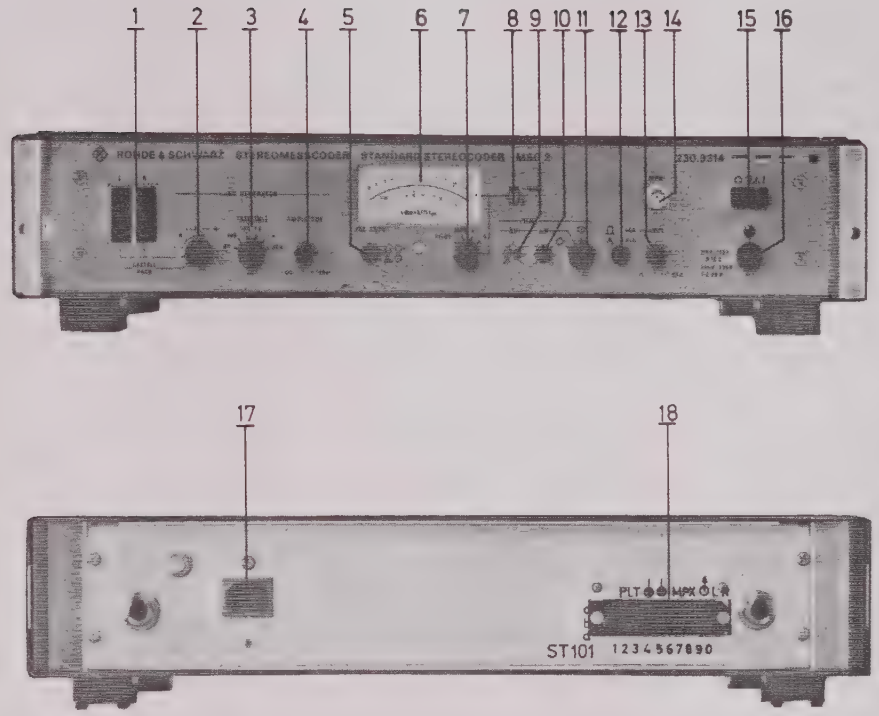


Fig. 1 Front-and rear-panel controls

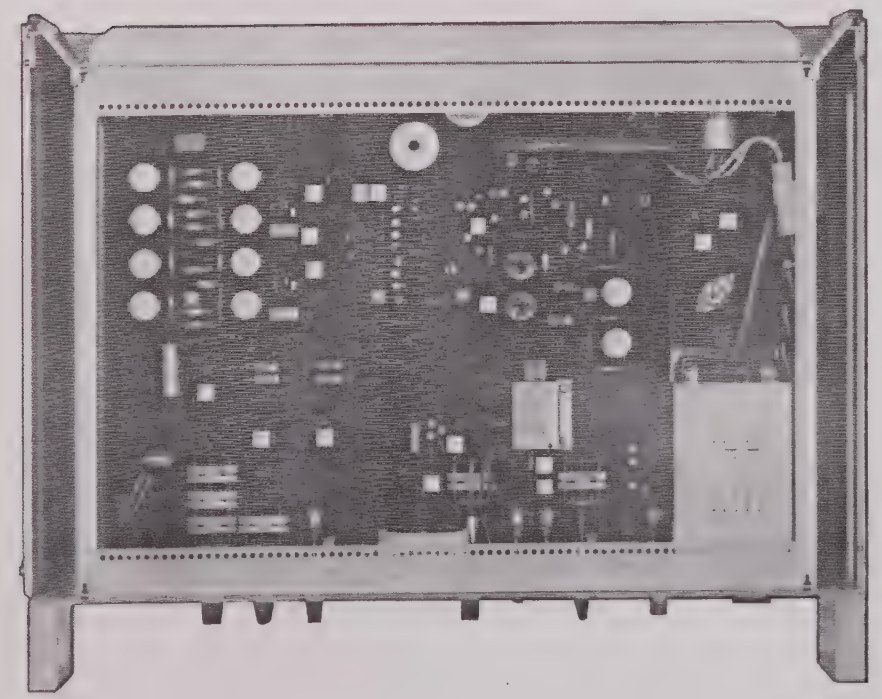


Fig. 2 Interior view

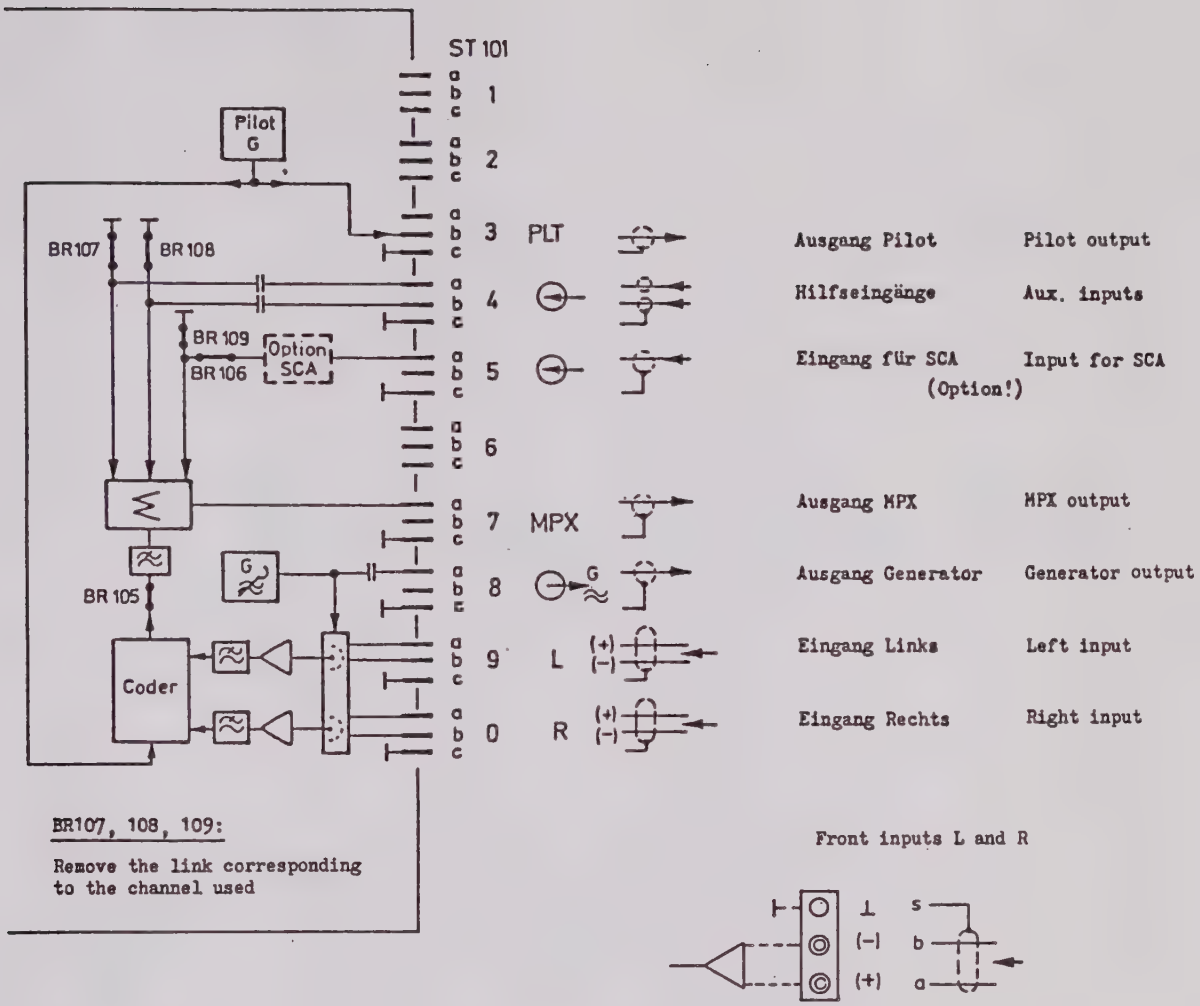
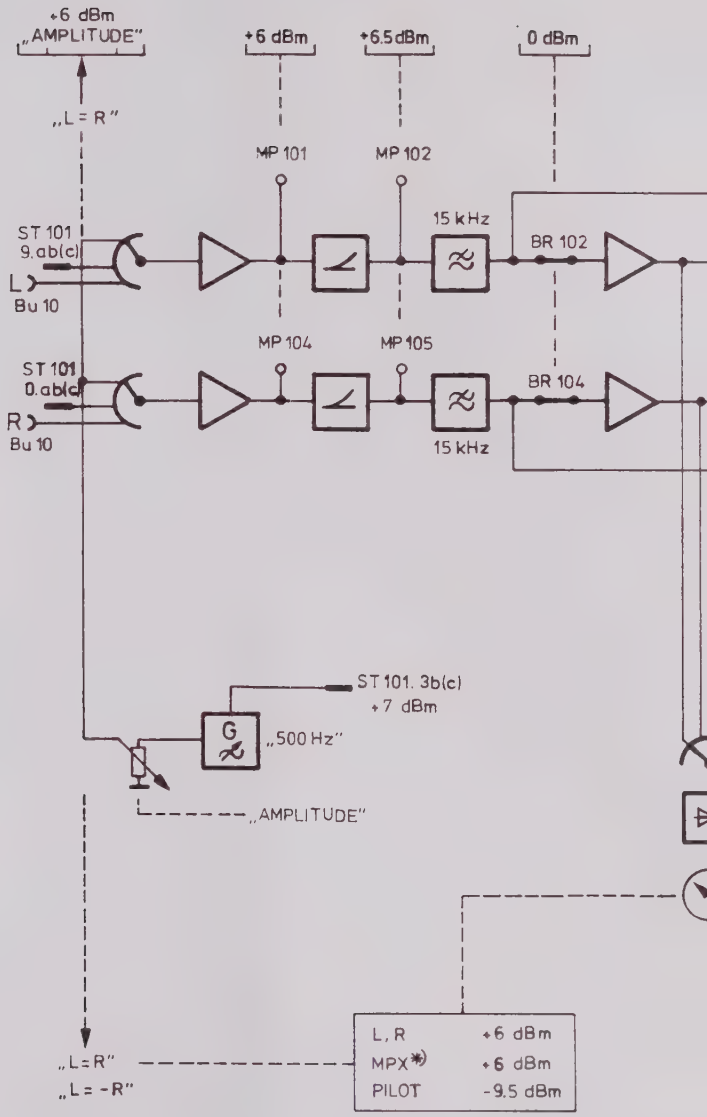


Fig. Pin assignment

Frequenz / Frequency		0,3	0,5	1	1,5	2	3	4	6	8	10	12	14	15	kHz
Preemphasis	50 µs	0.04	0,11	0,41	0,87	1,45	2,76	4,11	6,58	8,64	10,36	11,82	13,08	13,66	dB
	75 µs	0,086	0,23	0,87	1,76	2,76	4,77	6,58	9,54	11,82	13,66	15,18	16,49	17,07	dB

Fig. Preemphasis



*) Without pilot

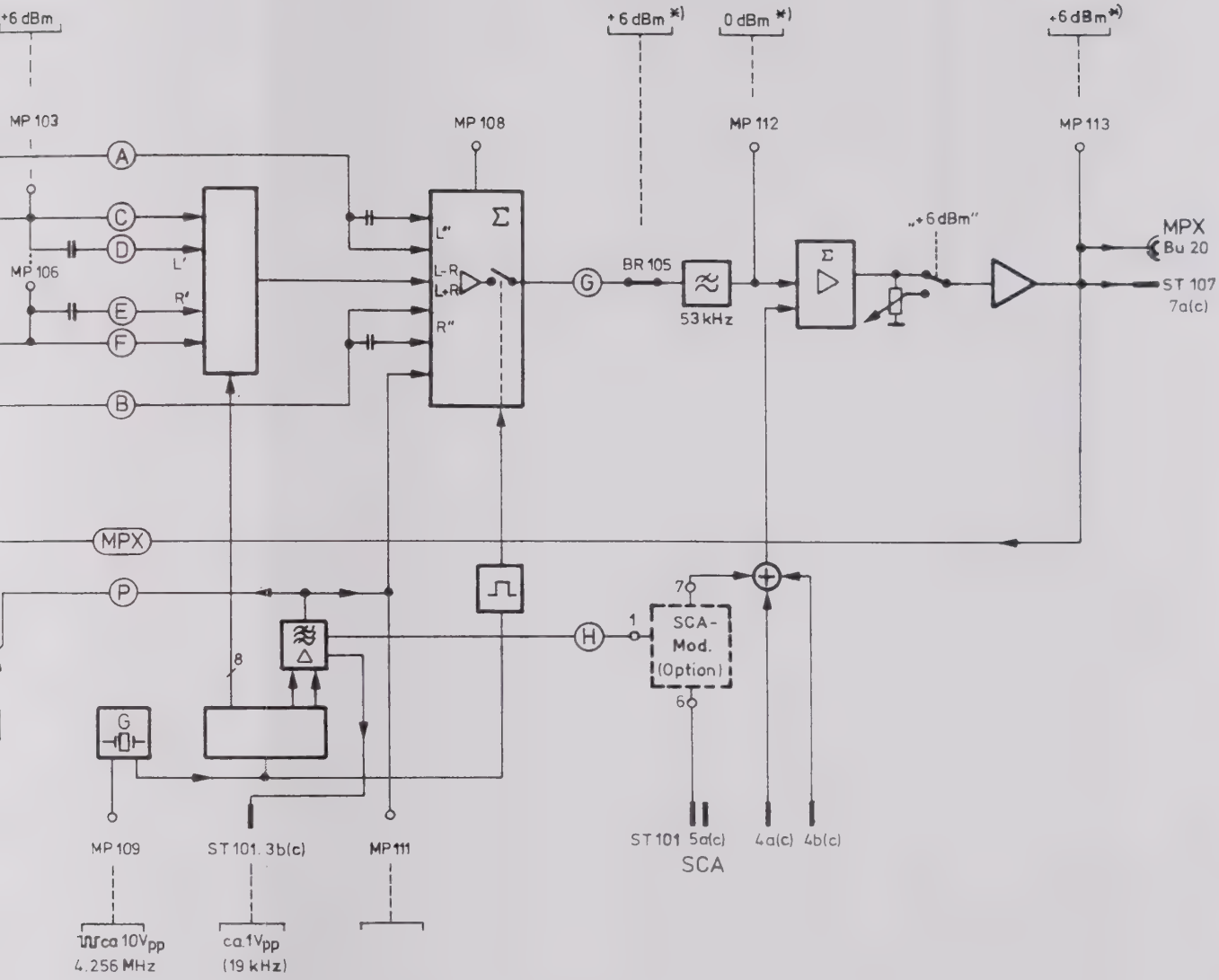


Fig. 5 Signal level diagram

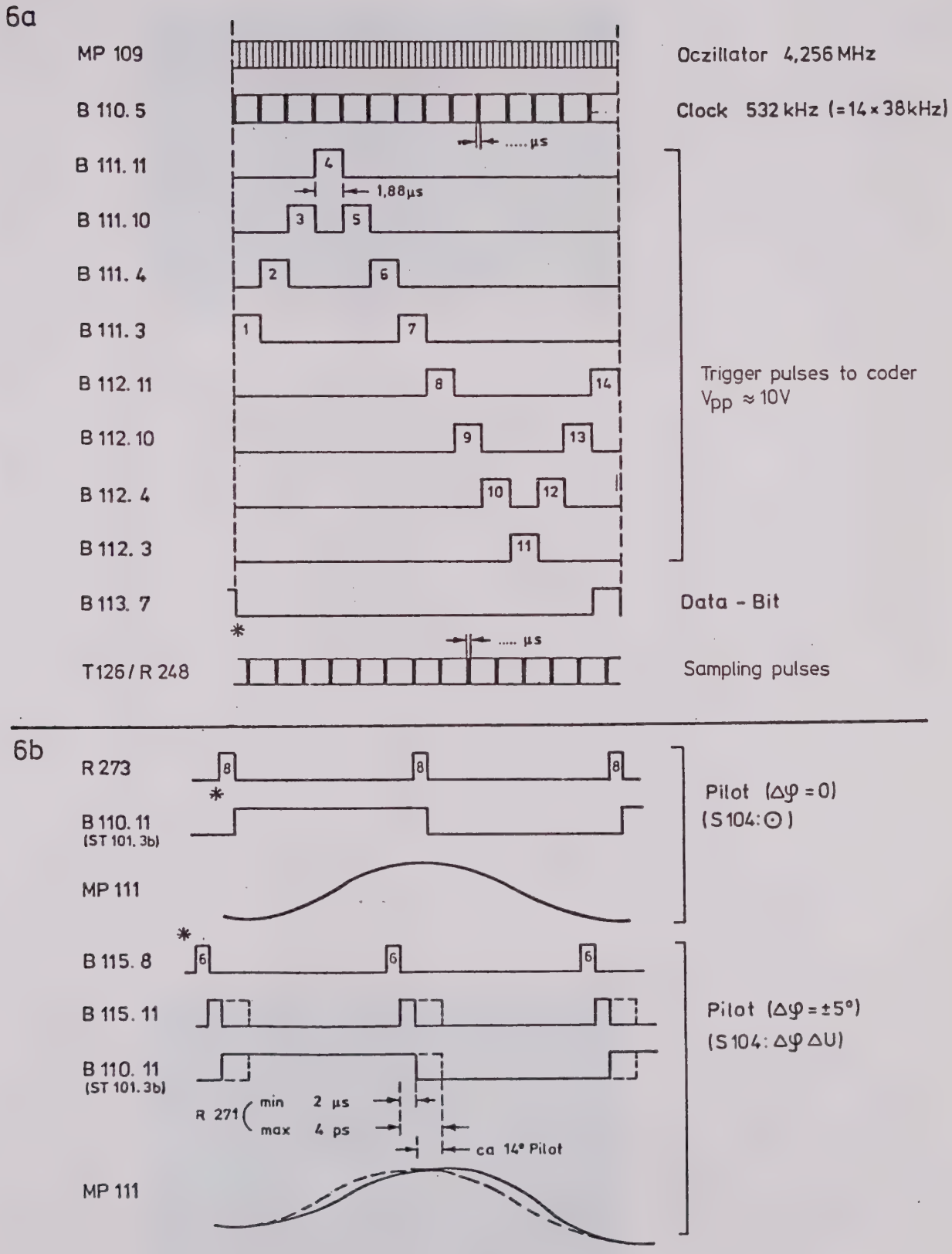
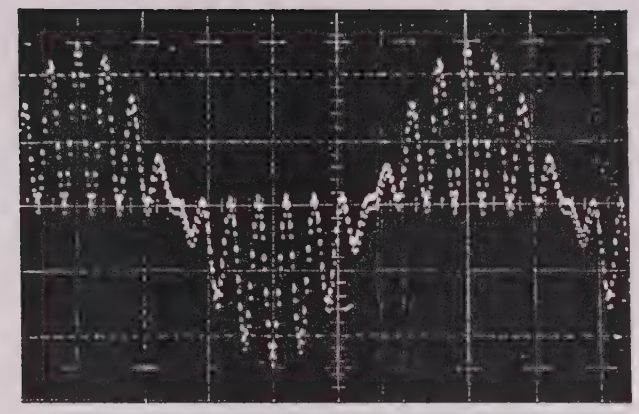
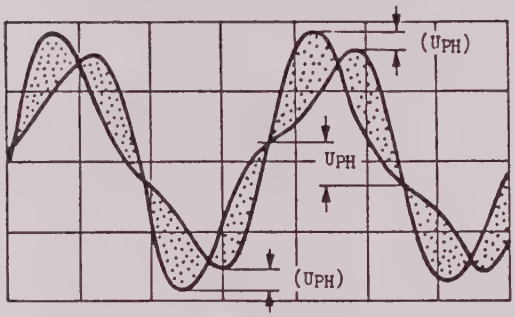


Fig. 6 Oscillograms
Pilot-tone generation

7 a

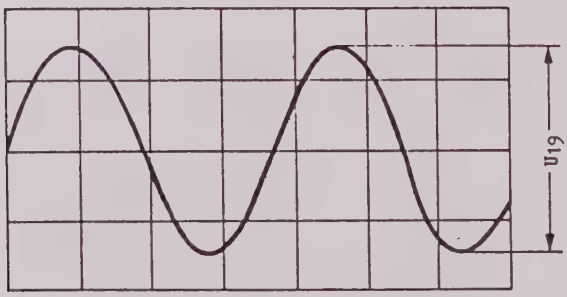


7 b



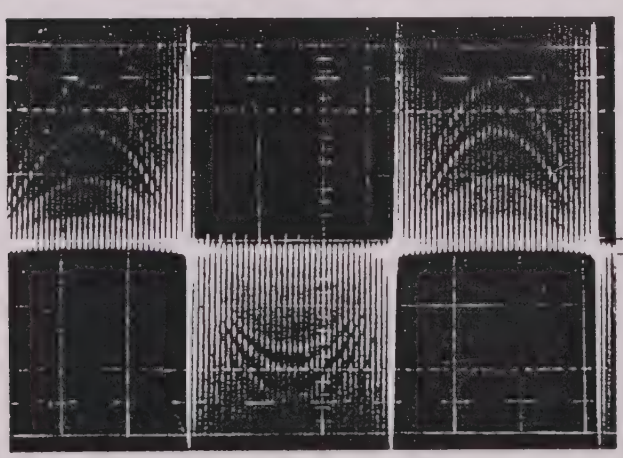
Difference signal + pilot tone

7 c



Pilot tone

7 d



Input level +6 dBm
(U_{pp} = 2.8 x 1.55 V = 4.34 V)

> 64 dB (= < 2.73 mVss)
> 72 dB (= < 1.08 mVss)

Crosstalk

100 times overload, i.e
one division approx. 7 mV

Fig. 7 Oscillograms
(Coder circuitry)

ROHDE&SCHWARZ

Schaltteillisten
Stromläufe
Bestückungspläne

Part lists
Circuit diagrams
Components plans

Listes des pièces détachées
Schémas de Circuit
Plans des composants

(R 29500 Bl 2)
095.1000 Bl. 2

ROHDE&SCHWARZ

R&S-Schlüsselliste
R&S key list
Liste des symboles de référence R&S

Die R&S-Schaltteillisten nennen in der Spalte "Benennung/Beschreibung" die technischen Daten der Bauelemente in Kurzform. Die Art des Bauelements (z.B. Schicht-, Draht-Widerstand usw.) beschreiben die 2 Kennbuchstaben vor der "Benennung" (evtl. auch vor der "Sachnummer"), die nachfolgend erklärt werden. In Ersatzteil-Bestellungen an R&S ist stets die Angabe der vollständigen Sachnummer erforderlich.

The R&S Parts Lists give the technical data of the components in short form in the column "Benennung/Beschreibung" (designation). The type of component (e.g. depos.-carbon resistor, wire-wound resistor etc.) is indicated by 2 identification letters before the designation, possibly also before the "Sachnummer" (order number), which are explained below. When ordering spare parts from R&S, the complete order number must always be specified.

La colonne «Désignation/description» des listes de pièces de R&S indique les caractéristiques des éléments sous forme abrégée. Le type d'élément (p. ex. résistance à couche, résistance bobinée etc. ...) est décrit par les deux lettres précédant la désignation (et éventuellement le numéro de référence), dont voici l'explication. Prière d'indiquer le numéro de référence («Sachnummer») complet dans toute commande de pièces de rechange.

Teile-familie	Art des Bauelementes	Parts family	Type of component	Famille	Type d'élément
A	**Aktive Bauelemente, Halbleiter**	**A**	**Active components, semiconductors**	**A**	**Composants actifs, semiconducteurs**
AD	Universaldiode, z.B. Gleichrichter, Sperrdiode	AD	General-purpose diode, e.g. rectifier, high-resistance diode	AD	Diode d'usage général, p.ex. redresseur, diode à haute résistance
AE	Spezialdiode, z.B. Tunnel-, Kapazitäts-, Zener-Diode	AE	Diode (special), e.g. tunnel diode, varactor, Zener diode	AE	Diode spéciale, p.ex. diode tunnel, varactor, diode Zener
AF	Fotohalbleiter, z.B. Foto-Diode, -Transistor, -Widerstand, Leuchtdiode	AF	Photo-semiconductor, e.g. resistor, diode, transistor, LED	AF	Semiconducteur photoélectrique, p.ex. diode, transistor, résistance photoél., DEL
AG	Leistungs-Gleichrichter, z.B. Thyristor, Triac, Selengleichrichter	AG	Power rectifier, e.g. thyristor, triac, selenium rectifier	AG	Redresseur de puissance, p.ex. thyristor, triac, redresseur, au sélénium
AK	Kleinsignal-Transistor	AK	Small-signal transistor	AK	Transistor faible puissance
AL	Leistungs-Transistor	AL	High-power transistor	AL	Transistor grande puissance
AM	Spezial-Transistor, z.B. FET, MOSFET	AM	Transistor (special), e.g. FET, MOS-FET	AM	Transistor spécial, p.ex. TEC, MOSTEC
AP	Peltier-, Hall-Element	AP	Peltier element, Hall element	AP	Element Peltier, élément Hall
AR	Röhre für Empfänger, Verstärker, Gleichrichter	AR	Valve for receiver, amplifier, rectifier	AR	Tube pour récepteur, amplificateur, redresseur
AS	Spezialröhre, z.B. Senderöhre, EW-Widerstand, Stabilisator	AS	Valve (special), e.g. for transmitter, baretter, ballast valve	AS	Tube (spécial), p.ex. pour émetteur, résistance fer-hydrogène, ballast
AT	Katodenstrahlröhre, z.B. Bildröhre, Ziffern-Anzeigeröhre	AT	Cathode ray tube, e.g. picture tube, digital indicator tube	AT	Tube à rayon cathodique, p.ex. tube à image, tube à affichage numérique
AZ	Zubehör für Halbleiter u. Röhren	AZ	Accessories for semiconductors and valves	AZ	Accessoires pour semiconducteurs et tubes
B	**Bausteine**	**B**	**PC boards, chips**	**B**	**Cartes imprimées, puces**
BC	Integr. Schaltkreis (Microcomp.)	BC	Integrated circuit (interface, A/D)	BC	Circuit intégré (microprocesseur)
BD	R&S-Dünnschicht- und Dickschichtschaltung	BD	R&S thinfilm or thickfilm circuit	BD	Circuit R&S à couche mince ou épaisse
BG	R&S-spezifische Gate-Arrays	BG	R&S gate arrays	BG	Circuits intégrés prédiffusés R&S
BJ	Integrierter Schaltkreis (Interface, A/D-Wandler)	BJ	Integrated circuit (interface, A/D converter)	BJ	Circuit intégré (interface, convertisseur A/N)
BL	Log. Schaltkreis z.B. DTL, TTL, HTL, ECL, C-MOS	BL	Logic circuit, e.g. DTL, TTL, HTL, ECL, C-MOS	BL	Circuit logique, p.ex. DTL, TTL, HTL, ECL, C-MOS
BM	Hybridbaustein, z.B. Mischer, Tuner, Modulator	BM	Hybrid chip, e.g. mixer, tuner, modulator	BM	Puce hybride, p.ex. mélangeur, tuner, modulateur
BO	Analogschaltkreis, z.B. Operationsverstärker	BO	Analog circuit, e.g. operational amplifier	BO	Circuit analogique, p.ex. amplificateur opérationnel
BP	Optoelektronischer Baustein, z.B. Anzeigeeinheit, Koppler	BP	Optoelectronic component, e.g. display, coupler	BP	Composant optoélectronique, p.ex. afficheur, coupleur
BS	Schalt- und Steuerbaustein, elektronischer Sensor	BS	Switching and control modul, electronic sensor	BS	Modul de commutation et de commande, sonde électronique
BV	Stromversorgung, Übersp.-Schutz	BV	Power pack, protective circuit	BV	Alimentation, protection surcharge
BZ	Zubehör	BZ	Accessories	BZ	Accessoires

Teile-familie	Art des Bauelementes	Parts family	Type of component	Famil-le	Type d'element
C	**Kondensatoren**	**C**	**Capacitors**	**C**	**Condensateurs**
CB	Bypass-, Durchf.-Kondensator	CB	Bypass capacitor, feed-through capacitor	CB	Condensateur bypass, condensateur de traversée
CC	Keramischer Kondensator	CC	Ceramic capacitor	CC	Condensateur céramique
CD	Drehkondensator	CD	Variable capacitor	CD	Condensateur variable
CE	Elektrolytkondensator	CE	Electrolytic capacitor	CE	Condensateur électrolytique
CG	Glimmerkondensator	CG	Mica capacitor	CG	Condensateur au mica
CH	Sperrschichtkondensator	CH	Semiconductor capacitor	CH	Condensateur semiconducteur
CK	Kunstfolienkondensator	CK	Synthetic-foil capacitor	CK	Condensateur à feuille synthétique
CL	Ker. Hochsp.-Kondensator	CL	HV capacitor (ceramic)	CL	Condensateur HT céramique
CM	Metallpapier-Kondensator	CM	MP capacitor	CM	Condensateur à papier métallisé
CN	Kondensatornetzwerk	CN	Capacitor network	CN	Réseau capacitif
CP	Papierkondensator	CP	Paper capacitor	CP	Condensateur au papier
CS	Störschutzkondensator	CS	Interference-suppression capacitor	CS	Condensateur anti-parasite
CT	Trimmkondensator	CT	Trimmer capacitor	CT	Condensateur ajustable
CV	Vakuum-Kondensator	CV	Vacuum capacitor	CV	Condensateur à vide
D	**Drähte, Leitungen**	**D**	**Wires, lines**	**D**	**Fils, lignes**
DD	Schalt- und Wickeldraht	DD	Hook-up or winding wire	DD	Fil de câblage, fil de bobinage
DF	Flachleitung, Litze	DF	Flat multiple line, stranded wire	DF	Ligne plate, ligne torsadée
DG	Abgeschirmte Leitung	DG	Shielded line	DG	Ligne blindé
DH	Koaxialkabel	DH	Coaxial line	DH	Ligne coaxiale
DJ	Isolierschläuche, Schrumpf-schläuche, Wellrohre, Schutzschläuche	DJ	Insulating sheaths, shrink-on sleeves, corrugated tubes, protective tubes	DJ	Gaines isolantes, gaines thermorétractables tubes ondulés, gaines protectrices
DL	HF-Litzen	DL	RF stranded wires	DL	Lignes torsadées RF
DM	Schaltlitzen (mehrdrähtige Leiter)	DM	Multi-conductor wires	DM	Lignes torsadées (multiconducteurs)
DN	Antenne	DN	Antenna	DN	Antenne
DO	Lichtleiter (optisch)	DO	Optical waveguides	DO	Guides d'onde optiques
DP	Leiterplatten (unbestückt)	DP	Printed circuit boards (bare)	DP	Cartes imprimées (non équipées)
DQ	Multilayer (unbestückt)	DQ	Multilayer boards (bare)	DQ	Cartes multicouche (non équipées)
DS	Anschlußkabel (mehradrig)	DS	Connecting cable, multicore	DS	Câble de connexion (multiconducteur)
DU	Substratplatten für Dickschicht-schaltungen	DU	Substrate boards for thickfilm circuits	DU	Cartes à substrat pour circuits à couche épaisse
DW	Festmantelkabel	DW	Rigid cables	DW	Câbles rigides
E	**Elektrische Teile**	**E**	**Electric parts**	**E**	**Organes électriques**
EB	Blei-, NC-Akku, Batterie	EB	Lead or alkaline accumulator, battery	EB	Accumulateur Pb/NC, batterie
ED	Gedruckte Schaltung (bestückte Leiterplatte), nicht steckbar	ED	Printed circuits (assembled), non-pluggable	ED	Circuits imprimés (équipés) non enfichables
EE	Gedruckte Schaltung (bestückte Leiterplatte), steckbar	EE	Printed circuits (assembled), pluggable	EE	Circuits imprimés (équipés) enfichables
EF	Glühlampe, Leuchte	EF	Incandescent lamp, pilot lamp	EF	Lampe à incandescence, voyant
EG	Glimmlampe, Entladungslampe	EG	Glow lamp, discharge lamp	EG	Lampe à luminescence lampe à décharge
EK	Kontakt-Streifen, -Feder	EK	Contact clip, contact spring	EK	Lampe de contact, ressort de contact
EL	Lautsprecher, Kopfhörer, Mikrofon	EL	Loudspeaker, headphones, microphone	EL	Haut-parleur, casque, microphone
EM	Motor, Hubmagnet, Drehfeldsystem	EM	Motor, lifting magnet, synchro system	EM	Moteur, électro-aimant de levage, système synchro
EO	Oszillator, z.B. Quarzoszillator	EO	Oscillator, e.g. crystal oscillator	EO	Oscillateur p.ex. oscillateur à quartz
EP	Tief-, Band-, Hochpaß, Bandsperre, Diskriminator	EP	Lowpass, bandpass, highpass filter, band-stop filter, discriminator	EP	Filtre passe-bas, passe-bande, passe-haut, suppression de bande, discriminateur
EQ	Schwing-, Filter-Quarz	EQ	Oscillator or filter crystal	EQ	Quartz oscillateur, quartz de filtre
ER	Resonator, piezoelektr./magnetostriktiv	ER	Resonator, piezoelectric/ magnetostrictive	ER	Résonateur piézo-électrique/ magneto-strictif
ES	Passive SHF-Bauteile	ES	Passive SHF-components	ES	Composant SHF passif
ET	Thermostat	ET	Thermostat	ET	Thermostat
EV	Lüfter, Geblase	EV	Ventilator, blower	EV	Ventilateur, soufflerie

R&S-Schlüsselliste
R&S key list
Liste des symboles de référence R&S

ROHDE&SCHWARZ

Teile-familie	Art des Bauelementes	Parts family	Type of component	Famille	Type d'élément
F	**Fassungen, Steckverbindungen**	**F**	**Sockets, connectors**	**F**	**Douilles, connecteurs**
FG	Koax-Umrüstsatz	FG	Coaxial screw-in assembly	FG	Ensemble vissable coaxial
FH	Koax-Übergang auf Fremdsystem	FH	Coaxial adapter	FH	Adaptateur coaxial
FJ	BNC-Systemteil	FJ	BNC screw-in assembly	FJ	Ensemble vissable BNC
FK	Koaxial-UHF-Systemteil	FK	Coaxial UHF screw-in assembly	FK	Ensemble vissable coaxial UHF
FM	Mehrfachstecker, Buchsenleiste	FM	Multipoint connector	FM	Connecteur multiple
FN	Netz-Steckverbindung	FN	AC-supply connector	FN	Connecteur secteur
FO	Runde Mehrfach-Steckverbindung	FO	Round multipoint connector	FO	Connecteur multipoles rond
FP	Druckschalt-Steckverbindung	FP	Multipoint connector for PC boards	FP	Connecteur multipoles pour cartes imprimées
FR	Fassung für Lampe, Sicherung, usw.	FR	Socket for lamp, fuse, etc.	FR	Douille pour lampe, fusible etc. . . .
FT	Schwachstrom-Steckverbindung	FT	LV plug and socket	FT	Connecteur pour faible courant
FU	Hochspannungs-Steckverbindung	FU	HV plug and socket	FU	Connecteur pour haute tension
FV	Verbinder (z.B. AMP)	FV	Push-on connector	FV	Connecteur à enfichage
FZ	Zubehör für koax. Bauelemente	FZ	Accessories for coax. components	FZ	Accessoires pour composants coax.
H	**Software**	**H**	**Software**	**H**	**Logiciel**
HP	Software-Komponenten und Software-Module	HP	Rights to software components and software modules	HP	Droits d'utilisation de composants et modules logiciel
HS	Auf Informationsträger geladene Software	HS	Software data media	HS	Logiciel sur support d'information
J	**Meßinstrumente**	**J**	**Indicators**	**J**	**Indicateurs**
JD	Drehspul-Anzeigeinstrument	JD	Moving-coil meter	JD	Galvanomètre à cadre mobile
JE	Dreheisen-Anzeigeinstrument	JE	Moving-iron meter	JE	Galvanomètre à fer mobile
JF	Frequenzmesser	JF	Frequency meter	JF	Fréquencemètre
JG	Drehspulinstrument mit Gleichrichter	JG	Moving-coil meter with rectifier	JG	Galvanomètre à cadre mobile avec redresseur
JH	Betriebsstundenzähler	JH	Operating-hours counter	JH	Compteur d'heures de fonctionnement
JJ	Impulszähler	JJ	Pulse counter	JJ	Compteur d'impulsions
JK	Kleinst-Instrument, z.B. Abstimmanzeiger	JK	Mini-instrument, e.g. tuning indicator	JK	Petit indicateur, p.ex. indicateur d'accord
JM	Mechanisches Zählwerk	JM	Mechanical counter	JM	Compteur mécanique
JP	Projektions-Instrument (Leuchtziffer)	JP	Digital display	JP	Afficheur numérique
JQ	Quotientenmesser (Kreuzspulinstrum.)	JQ	Ratiometer (cross coul)	JQ	Quotientmètre (à cadres croisés)
JU	Uhrwerk	JU	Clockwork	JU	Mouvement d'horlogerie
JW	Elektrodyn. Anzeigeinstrument	JW	Electrodynamic meter	JW	Instrument électrodynamique
L	**Induktivitäten, Magnetik**	**L**	**Inductors, magnetic components**	**L**	**Composants inductifs et magnétiques**
LB	Blech- und Schnittbandkern mit Zubehör	LB	Laminated and C-cores with accessories	LB	Noyaux feuilletés et noyaux de type C, avec accessoires
LC	Keramische Spule	LC	Ceramic coil	LC	Bobine céramique
LD	Netz-, HF-Drossel, Df-Filter	LD	Choke, lead-through filter	LD	Self de choc, filtre de traversée
LE	Einzelkreis, Bandfilter	LE	Single tuned circuit, bandpass filter	LE	Circuit accordé, filtre passe-bande
LF	Ferritkern mit Zubehör	LF	Ferrite cores with accessories	LF	Noyaux en ferrite avec accessoires
LK	Karbonyleisenkern und elektrischer Kupferkern mit Zubehör	LK	Iron carbonyl slugs and copper slugs with accessories	LK	Noyaux en fer carbonyle et en cuivre, avec accessoires
LL	Luftspule	LL	Air-core coils	LL	Bobines à air
LM	Magnetband und -platte	LM	Magnetic tapes and disks	LM	Bandes et disques magnétiques
LS	Schirmbecher	LS	Screening cans	LS	Boîtiers de blindage
LT	Netztransformator	LT	Power transformer	LT	Transformateur secteur
LU	NF-Übertrager	LU	AF transformer	LU	Transformateur BF
LV	Variometer	LV	Variometer	LV	Variomètre
LW	Wickelkörper, allgemein	LW	Coil formers, general	LW	Carcasses de bobine, en général

Teile-familie	Art des Bauelementes	Parts family	Type of component	Famil-ie	Type d'element
R	**Widerstände**	**R**	**Resistors**	**R**	**Résistances**
RD	Drahtwiderstand	RD	Wire-wound resistor	RD	Résistance bobinée
RF	Kohleschicht-Widerstand	RF	Carbon-film resistor	RF	Résistance à couche de carbone
RG	Metallglasur-Widerstand	RG	Metal-coated resistor	RG	Résistance à couche métallique
RJ	Metalloxyd-Widerstand	RJ	Metal-oxide resistor	RJ	Résistance à oxyde métallique
RK	Kaltleiter, Heißleiter, Varistor	RK	PTC, NTC resistors, varistors	RK	Résistances CPT, CNT, varistors
RL	Metallfilm-Widerstand	RL	Metal-film resistor	RL	Résistance à film métallique
RN	Widerstandsnetzwerk	RN	Resistor network	RN	Réseau de résistance
RR	Draht-Potentiometer	RR	Wire-wound potentiometer	RR	Potentiomètre bobiné
RS	Schicht-Potentiometer	RS	Carbon-film potentiometer	RS	Potentiomètre à couche
RT	Dämpfungsglied, Abschlußwiderstand	RT	Attenuator, termination	RT	Atténuateur, charge
RV	Drahtwiderstand mit Abgriff	RV	Wire-wound resistor, tapped	RV	Résistance bobinée à prise
RW	Wendelpotentiometer	RW	Helical potentiometer	RW	Potentiomètre hélicoidal
S	**Schalter, Relais, Sicherungen**	**S**	**Switches, relays, fuses**	**S**	**Commutateurs, relais, fusibles**
SB	Drucktastenschalter	SB	Pushbutton switch	SB	Commutateur à touche
SD	Drehschalter	SD	Rotary switch	SD	Commutateur rotatif
SF	Kontaktfedersatz	SF	Spring contact assembly	SF	Jeu de ressorts de contact
SH	HF-Koaxialschalter, -Relais, -Teiler	SH	Coaxial RF switch, RF relay, RF attenuator	SH	Commutateur RF coaxial, relais RF, atténuateur RF
SK	Kipp-, Wipp- und Schiebeschalter	SK	Toggle switch, slide switch	SK	Commutateur à bascule, à glissière
SL	Leistungsschalter Netz/HF	SL	AC supply switch, high-power RF switch	SL	Commutateur secteur, de puissance RF
SM	Mikroschalter	SM	Microswitch	SM	Microrupteur
SN	Elektromagnet, Relais	SN	Electromagnetic relay	SN	Relais électromagnétique
SP	Leistungsrelais, Luftschütz	SP	Power relay, air-type contactor	SP	Relais de puissance, contacteur à air
SR	Reedrelais	SR	Reed relay	SR	Relais reed
SS	Sicherung, Schutzschalter	SS	Fuse, automatic cut-out	SS	Fusible, coupe-circuit automatique
ST	Thermoschalter	ST	Thermal circuit breaker	ST	Disjoncteur thermique
SU	Überspannungs-Ableiter	SU	Arrester	SU	Eclateur
SW	Wechselrichter, Näherungsschalter	SW	Inverter (DC-AC), proximity switch	SW	Inverseur (DC-AC), commutateur de proximité
SZ	Zeitschalter	SZ	Time switch	SZ	Interrupteur horaire
V	**Verbindungselemente**	**V**	**Connecting elements**	**V**	**Eléments de raccordement**
VK	Klemme, Klemmleiste	VK	Clamp, terminal strip	VK	Pince, réglette à bornes
VL	Lötöse, Stützpunkt	VL	Soldering lug	VL	Cosse à souder
VS	Schraube, Mutter, Scheibe	VS	Screw, nut, washer	VS	Vis, écrou, disque

Farbcode für Widerstände und Kondensatoren

Anmerkung:
Die Wertangabe der weitgehend miniaturisierten Bauelemente erfolgt überwiegend durch Farbkennzeichnungen, deren Bedeutung der nachfolgenden Tabelle entnommen werden kann.

Hinweis:
Im Zuge des technischen Fortschrittes setzt R&S zunehmend Metallschichtwiderstände mit 1% Toleranz anstelle von Kohleschichtwiderständen mit 5% Toleranz ein. Metallschichtwiderstände können sich dabei an Stellen befinden, an denen gemäß Schaltteilliste Kohleschichtwiderstände vorgesehen sind. Etwaige geringfügige Differenzen der Nennwerte zwischen Stromlaufplan, Schaltteilliste und Gerät liegen im zulässigen Toleranzbereich.

Colour code for resistors and capacitors

Note:
The electrical values of the largely miniaturized components are mainly identified by a colour code, the meaning of which can be taken from the table below.

N. B.:
Following the state of the art R&S makes increasing use of metal-film resistors (1% tolerance) instead of carbon-film resistors (5% tolerance). Metal-film resistors may have been employed where carbon-film resistors are specified in the parts list. Any slight differences of nominal values between circuit diagram, parts list and equipment are within tolerance.

Code couleur pour résistances et condensateurs

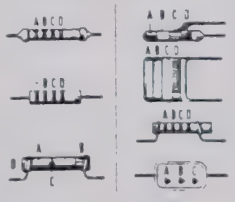
Remarque:
Les valeurs électriques des composants fort miniaturises sont indiquées dans la plupart des cas par un code couleur dont voici l'explication

N. B.:
Suivant le progres technique R&S utilise de plus en plus des résistances à film métallique (tolérance 1%) au lieu des résistances à couche de carbone (tolérance 5%). Des resistances à film metallique peuvent se trouver en des points où des types à couche de carbone figurent dans la liste des composants. Les différences minimes des valeurs nominales existant eventuellement entre le schema de circuit, la liste des composants et l'appareil sont dans la marge de tolérance.

Farbe/Colour/Couleur	A	B	C	D
Schwarz/Black/Noir	—	0		
Braun/Brown/Marron	1	1	0	± 1%
Rot/Red/Rouge	2	2	00	± 2%
Orange/Orangé	3	3	000	
Gelb/Yellow/Jaune	4	4	0000	
Grun/Green/Vert	5	5	00000	± 0,5%
Blau/Blue/Bleu	6	6	000000	
Violett/Violet	7	7	—	± 0,1%
Grau/Gray/Gris	8	8	—	
Weiß/White/Blanc	9	9	—	
Gold/Doré	—	—	—	± 5%
Silber/Silver/Argenté	—	—	—	± 10%
Ohne Farbe/No colour/ Pas de couleur	—	—	—	± 20%

Anordnungsbeispiele fur / Examples for / Exemple pour

Widerstande (R) / Resistance (R)	Kondensat. (C) / Condensateur (C)
Resistors (R)	Capacitors (C)



1) Toleranzring, hier nicht spezifiziert.

1) Tolerance ring, here not specified

1) Anneau de tolerance, ne pas specifie ici.

Definition* / Definition *

Kennzeichen A (Bauteilfarbe/1. Farbring) = 1. Zahl
Kennzeichen B (Bauteilende/2. Farbring) = 2. Zahl
Kennzeichen C (Punkt/3. Farbring) - 3. Zahl = Zahl der Nullen
Kennzeichen D (Punkt/4. Farbring) = Toleranz des Nennwerts in %
(Fehlendes Kennzeichen fur D bedeutet ±20%)

Das Fehlen eines Kennzeichens bedeutet, daß die Farbe des Bauteilkorpers die Wertangabe darstellt.

Marking A (body colour or first coloured ring) = 1st digit
Marking B (body end or second coloured ring) = 2nd digit
Marking C (dot or third coloured ring) = number of zeroes
Marking D (dot or fourth coloured ring) = tolerance on nominal value in %
(with no D marking tolerance ± 20%)

The absence of a marking signifies that the body colour gives the corresponding information.

Reperage A (couleur du corps ou 1er anneau) = 1er chiffre
Reperage B (bout du corps ou 2e anneau) = 2e chiffre
Reperage C (point ou 3e anneau) = nombre de zeros
Reperage D (point ou 4e anneau) = tolerance en % de la valeur nominale
(L absence du reperage D signifie ± 20%)

L'absence de tout reperage signifie que la couleur du corps du composant represente la valeur correspondante

* Siehe auch DIN 41 429 und DIN 40 825

* see also IEC publication 62-1952 and 62-1968

* Voir aussi DIN 41 429 et DIN 40 825

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
B101 ..106	BO LF156J BIFET OPAMP OPERATIONAL AMPLIFIER	BO 645.7251	MOTOROLA	LF156J	230.9614
B107	BO LF157J BIFET OPAMP OPERATIONAL AMPLIFIER	BO 343.1530	MOTOROLA	LF157J	230.9614
B108	BO TL072ACP 2XFET OPAMP OPERATIONAL AMPLIFIER	340.6054	TEXAS INST	TL072ACP	230.9614
B109	BL CD4049UBE 6XINVERTER HEXINVERTER	086.7244	RCA	CD4049UBE	230.9614
B110	BL CD4520BE 2XBIN.COUNT COUNTER	299.6908	RCA	CD4520BE	230.9614
B111	BL CD4071BE 4X2IN. ORG OR GATE	299.6866	RCA	CD4071BE	230.9614
B112	BL CD4071BE 4X2IN. ORG OR GATE	299.6866	RCA	CD4071BE	230.9614
B113	BL CD4015BE 2X4B.SH.REG SHIFT REGISTER	086.7044	RCA	CD4015BE	230.9614
B114	BL CD4015BE 2X4B.SH.REG SHIFT REGISTER	086.7044	RCA	CD4015BE	230.9614
B115	BL CD4047AE MULTIVIBR. MULTIVIBRATOR	086.7221	RCA	CD4047AE	230.9614
BR101	FP STIFTLEISTE 36P.R2,54 PIN CONNECTOR 3-POLIG	FP 242.3600	BINDER	742-5-11-0178-00-36	230.9614
BR102	FP STIFTLEISTE 36P.R2,54 PIN CONNECTOR 3-POLIG	FP 242.3600	BINDER	742-5-11-0178-00-36	230.9614
BR103	FP STIFTLEISTE 36P.R2,54 PIN CONNECTOR 3-POLIG	FP 242.3600	BINDER	742-5-11-0178-00-36	230.9614
BR104	FP STIFTLEISTE 36P.R2,54 PIN CONNECTOR 3-POLIG	FP 242.3600	BINDER	742-5-11-0178-00-36	230.9614
BR105	FP STIFTLEISTE 36P.R2,54 PIN CONNECTOR 2-POLIG	FP 242.3600	BINDER	742-5-11-0178-00-36	230.9614
BR106	FP STIFTLEISTE 36P.R2,54 PIN CONNECTOR 2-POLIG	FP 242.3600	BINDER	742-5-11-0178-00-36	230.9614
BR107	FP STIFTLEISTE 36P.R2,54 PIN CONNECTOR 2-POLIG	FP 242.3600	BINDER	742-5-11-0178-00-36	230.9614
BR108	FP STIFTLEISTE 36P.R2,54 PIN CONNECTOR 2-POLIG	FP 242.3600	BINDER	742-5-11-0178-00-36	230.9614
BU10	FT NF-BU.GESCH.2MAL2P+ERD PANEL SOCKET	FT 019.0470	SIEMENS	C42334-A176-A21	230.9350
BU20	FJ EINBAUBUCHSE BNC ISOLI PANEL SOCKET	FJ 083.7066	ROSENBERGE	51C 047-200 P4	230.9350
C101	CK 10NF+-1% 63V RD 7X18KS CAPACITOR	024.4593	SCHUEMANN	CKS10000/1/63/40	230.9614
C102	CK 15NF+-1% 63V RD 8X18KS CAPACITOR	024.4612	SCHUEMANN	CKS15000/1/63/40	230.9614
C103	CK 3,3NF2,5%160V RD7X11,5 PLASTIC-FOIL CAPACITOR	CK 060.4854	SIEMENS	B31063-A5332-H	230.9614
C104	CK 470PF2,5%160V RD5X11,5 CAPACITOR	CK 060.4754	SIEMENS	B31063-A5471-H000	230.9614
C105	CK 4,7NF2,5%160V RD8X11,5 PLASTIC-FOIL CAPACITOR	CK 060.4877	SIEMENS	B31063-A5472-H	230.9614
C106	CK 2,7NF2,5%160V RD7X11,5 PLASTIC-FOIL CAPACITOR	CK 060.4848	SIEMENS	B31063-A5272-H	230.9614
C107	CK 3,3NF2,5%160V RD7X11,5 PLASTIC-FOIL CAPACITOR	CK 060.4854	SIEMENS	B31063-A5332-H	230.9614
C108	CK 3,9NF2,5%160V RD8X11,5 CAPACITOR	CK 060.4860	SIEMENS	B31063-A5392-H	230.9614
C109	CK 3,9NF2,5%160V RD8X11,5 CAPACITOR	CK 060.4860	SIEMENS	B31063-A5392-H	230.9614
C110	CK 2,2UF+-10% 63V QUADER CAPACITOR	CK 024.6996	ROEDERST	MKT1822-522/06/10%	230.9614
C111	CK 1,8NF2,5%160V RD6X11,5 PLASTIC-FOIL CAPACITOR	CK 060.4825	SIEMENS	B31063-A5182-H	230.9614
C112	CK 2,2NF2,5%160V RD6X11,5 PLASTIC-FOIL CAPACITOR	CK 060.4831	SIEMENS	B31063-A5222-H	230.9614
C113	CC 3,3NF+-10%6X7R2000 CAPACITOR	CC 087.7083	PHILIPS-CO	2222 63051 332	230.9614
C114	CK 2,2UF+-10% 63V QUADER CAPACITOR	CK 024.6996	ROEDERST	MKT1822-522/06/10%	230.9614

Für diese Unterlage behalten wir uns alle Rechte vor

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
C115	CE 4,7UF-10+50% 63V 9X13 ELECTROLYTIC CAPACITOR	CE 022.7643	ROEDERST	ELKOEK4/63	230.9614
C116	CE 4,7UF-10+50% 63V 9X13 ELECTROLYTIC CAPACITOR	CE 022.7643	ROEDERST	ELKOEK4/63	230.9614
C120	CK 33NF+-1%63V8RDX18 KS CAPACITOR	024.8830	SCHUEMANN	CKS33000/1/63/40	230.9614
C121	CK 10NF+-1% 63V RD 7X18KS CAPACITOR	024.4593	SCHUEMANN	CKS10000/1/63/40	230.9614
C122	CK 15NF+-1% 63V RD 8X18KS CAPACITOR	024.4612	SCHUEMANN	CKS15000/1/63/40	230.9614
C123	CK 3,3NF2,5%160V RD7X11,5 PLASTIC-FOIL CAPACITOR	CK 060.4854	SIEMENS	B31063-A5332-H	230.9614
C124	CK 470PF2,5%160V RD5X11,5 CAPACITOR	CK 060.4754	SIEMENS	B31063-A5471-H000	230.9614
C125	CK 4,7NF2,5%160V RD8X11,5 PLASTIC-FOIL CAPACITOR	CK 060.4877	SIEMENS	B31063-A5472-H	230.9614
C126	CK 2,7NF2,5%160V RD7X11,5 PLASTIC-FOIL CAPACITOR	CK 060.4848	SIEMENS	B31063-A5272-H	230.9614
C127	CK 3,3NF2,5%160V RD7X11,5 PLASTIC-FOIL CAPACITOR	CK 060.4854	SIEMENS	B31063-A5332-H	230.9614
C128	CK 3,9NF2,5%160V RD8X11,5 CAPACITOR	CK 060.4860	SIEMENS	B31063-A5392-H	230.9614
C129	CK 3,9NF2,5%160V RD8X11,5 CAPACITOR	CK 060.4860	SIEMENS	B31063-A5392-H	230.9614
C131	CK 1,8NF2,5%160V RD6X11,5 PLASTIC-FOIL CAPACITOR	CK 060.4825	SIEMENS	B31063-A5182-H	230.9614
C132	CK 2,2NF2,5%160V RD6X11,5 PLASTIC-FOIL CAPACITOR	CK 060.4831	SIEMENS	B31063-A5222-H	230.9614
C133	CC 3,3NF+-10%6X7R2000 CAPACITOR	CC 087.7083	PHILIPS-CO	2222 63051 332	230.9614
C134	CK 2,2UF+-10% 63V QUADER CAPACITOR	CK 024.6996	ROEDERST	MKT1822-522/06/10%	230.9614
C135	CE 4,7UF-10+50% 63V 9X13 ELECTROLYTIC CAPACITOR	CE 022.7643	ROEDERST	ELKOEK4/63	230.9614
C136	CE 4,7UF-10+50% 63V 9X13 ELECTROLYTIC CAPACITOR	CE 022.7643	ROEDERST	ELKOEK4/63	230.9614
C137	CE 4,7UF-10+50% 63V 9X13 ELECTROLYTIC CAPACITOR	CE 022.7643	ROEDERST	ELKOEK4/63	230.9614
C138	CE 4,7UF-10+50% 63V 9X13 ELECTROLYTIC CAPACITOR	CE 022.7643	ROEDERST	ELKOEK4/63	230.9614
C139	CK 100NF+-1% 63VRD13X18KS CAPACITOR	024.4670	SCHUEMANN	CKS100000/1/63/40	230.9614
C141	CE 220UF-10+50% 16V 13X17 ELECTROLYTIC CAPACITOR	CE 022.7566	SIEMENS	B41316-A4227-Z	230.9614
C142	CE 100UF-10+75% 20V10X34J ELECTROLYTIC CAPACITOR	CE 022.5070	SPRAGUE	ELK0600D107G030DE5	230.9614
C143	CE 22UF-10+50% 63V 9X13 ELECTROLYTIC CAPACITOR	CE 006.7120	ROEDERST	EKM 00 CB 222 J	230.9614
C144	CK 1,0UF+-10% 63V QUADER CAPACITOR	CK 087.0966	ROEDERST	MKC1862/510/06+10%	230.9614
C145	CC 10 NF +100%HDK6000 CERAMIC CAPACITOR	022.0678	PHILIPS-CO	2222 640 53103	230.9614
C146	CE 10UF -10+50% 63V 9X13 ELECTROLYTIC CAPACITOR	CE 022.7650	ROEDERST	ELKOEK10/63	230.9614
C147	CC 10PF+-0,5PF5N750 CERAMIC CAPACITOR	006.0325	PHILIPS-CO	2222 654 58109	230.9614
C148	CC 1,5PF+-0,25PF3X4P100 CAPACITOR TRIMMWERT	CC 087.6193	PHILIPS-CO	2222 678 03158	230.9614
C149	CC 2,2PF+-0,25PF3X4P100 CAPACITOR TRIMMWERT	CC 087.6212	PHILIPS-CO	2222 678 03228	230.9614
C150	CC 10PF+-0,5PF5N750 CERAMIC CAPACITOR	006.0325	PHILIPS-CO	2222 654 58109	230.9614
C151	CC 100PF+-20% HDK700 RD5 CERAMIC CAPACITOR	006.0431	PHILIPS-CO	2222 655 53101	230.9614
C152	CC 10PF+-0,5PF5N750 CERAMIC CAPACITOR	006.0325	PHILIPS-CO	2222 654 58109	230.9614
C153	CK 680PF2,5%160V RD5X11,5 CAPACITOR	CK 060.4777	SIEMENS	B 31063-A 5681-H 000	230.9614
C154	CC 18PF 5% N750/IB RD5 CERAMIC CAPACITOR	006.0354	DRALORIC	SDPN 5	230.9614
C155	CC 68 PF+-10 500VRD5R700 CERAMIC CAPACITOR	022.0984	DRALORIC	SDPN 5	230.9614
C156	CC 5 PF+-0,5 PF5P100 CERAMIC CAPACITOR	006.0083	DRALORIC	P100/IB5/0,5SDPN	230.9614
C157	CC 4,7NF+80-20%HDK6000 CERAMIC CAPACITOR	022.0603	PHILIPS-CO	2222 630 53472	230.9614

Kennz. Comp.No.	Benennung Designation		Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
C158	CC 68PF 2% N750/IA 3ROHR CERAMIC CAPACITOR		022.3460	DRALORIC	N750/IA68/1RD3X12LC	230.9614
C159	CT 30 PF N750 LIEG.ABGL.0 DISC TRIMMER	CT	025.6925	STETTNER	10S-TRIK006-10/40N75	230.9614
C161	CK 220NF+-20%100V QUADER CAPACITOR	CK	087.4049	ROEDERST	MKC1862-422/0	230.9614
C162	CE 22UF-10+50% 63V 9X13 ELECTROLYTIC CAPACITOR	CE	006.7120	ROEDERST	EKM 00 CB 222 J	230.9614
C163	CE 47UF-10+50% 40V 9X13 ELECTROLYTIC CAPACITOR	CE	006.7142	ROEDERST	EK 00 CB 247 G	230.9614
C164	CK 33NF+-1%63V8RDX18 KS CAPACITOR		024.8830	SCHUEMANN	CKS33000/1/63/40	230.9614
C165	CK 33NF+-1%63V8RDX18 KS CAPACITOR		024.8830	SCHUEMANN	CKS33000/1/63/40	230.9614
C166	CK 4,7NF2,5%160V RD8X11,5 PLASTIC-FOIL CAPACITOR	CK	060.4877	SIEMENS	B31063-A5472-H	230.9614
C167	CK 100NF+-20%100V QUADER PLASTIC-FOIL CAPACITOR	CK	006.5033	ROEDERST	MKT1822-410/0	230.9614
C168	CC 82PF 2% N750/IA 3ROHR CERAMIC CAPACITOR		022.3477	DRALORIC	RDLL	230.9614
C169	CK 220NF+-20%100V QUADER CAPACITOR	CK	087.4049	ROEDERST	MKC1862-422/0	230.9614
C170	CC 47PF 2% NPO/IB 3ROHR CERAMIC CAPACITOR		006.1273	DRALORIC	NPO/47/2RR3X14LC	230.9614
C171	CK 1,0NF2,5%160V RD5X11,5 PLASTIC-FOIL CAPACITOR	CK	060.4790	SIEMENS	B31063-A5102-H	230.9614
C172	CK 100PF2,5%160V RD5X11,5 PLASTIC-FOIL CAPACITOR	CK	060.4677	SIEMENS	B 31063-A 5101-H 000	230.9614
C173	CK 1,8NF2,5%160V RD6X11,5 PLASTIC-FOIL CAPACITOR	CK	060.4825	SIEMENS	B31063-A5182-H	230.9614
C174	CK 330PF2,5%160V RD5X11,5 PLASTIC FOIL CAPACITOR	CK	060.4731	SIEMENS	B 31063-A5331-H000	230.9614
C175	CK 390PF2,5%160V RD5X11,5 CAPACITOR	CK	060.4748	SIEMENS	B 31063-A 5391-H 000	230.9614
C176	CC 1 NF+50-20%5HDK4000 CERAMIC CAPACITOR		006.0490	PHILIPS-CO	2222 655 53102	230.9614
C177	CC 47NF+-10%100V K1200VIE CERAMIC CAPACITOR		068.4076	UNION CARB	CK06BX473K	230.9614
C178	CC 1 NF+50-20%5HDK4000 CERAMIC CAPACITOR		006.0490	PHILIPS-CO	2222 655 53102	230.9614
C179	CC 47NF+-10%100V K1200VIE CERAMIC CAPACITOR		068.4076	UNION CARB	CK06BX473K	230.9614
C180	CC 10 NF +100%HDK6000 CERAMIC CAPACITOR		022.0678	PHILIPS-CO	2222 640 53103	230.9614
C181	CC 1 NF+50-20%5HDK4000 CERAMIC CAPACITOR		006.0490	PHILIPS-CO	2222 655 53102	230.9614
C182	CE 4,7UF-10+50% 63V 9X13 ELECTROLYTIC CAPACITOR	CE	022.7643	ROEDERST	ELKOEK4/63	230.9614
C183	CE 4,7UF-10+50% 63V 9X13 ELECTROLYTIC CAPACITOR	CE	022.7643	ROEDERST	ELKOEK4/63	230.9614
C184	CC 10PF+-0,5PF5N750 CERAMIC CAPACITOR		006.0325	PHILIPS-CO	2222 654 58109	230.9614
C185	CC 100PF+-20% HDK700 RD5 CERAMIC CAPACITOR		006.0431	PHILIPS-CO	2222 655 53101	230.9614
C186	CE 10000UF-10+50%16V30X50 ELECTROLYTIC CAPACITOR	CE	219.3459	ROEDERST	EYVOOBB510D 01	230.9614
C187	CE 10000UF-10+50%16V30X50 ELECTROLYTIC CAPACITOR	CE	219.3459	ROEDERST	EYVOOBB510D 01	230.9614
C188	CC 220PF+-20% HDK2000 RD5 CERAMIC CAPACITOR		006.0454	PHILIPS-CO	2222 655 53221	230.9614
C191	CE 4,7UF-10+50% 63V 9X13 ELECTROLYTIC CAPACITOR	CE	022.7643	ROEDERST	ELKOEK4/63	230.9614
C192	CE 4,7UF-10+50% 63V 9X13 ELECTROLYTIC CAPACITOR	CE	022.7643	ROEDERST	ELKOEK4/63	230.9614
GL101 ...108	AD 1N4448 75V OA15 UDI DIODE	AD	012.0700	TEXAS INST	1N4448 GEGURTET	230.9614
GL111 ...119	AD 1N4448 75V OA15 UDI DIODE	AD	012.0700	TEXAS INST	1N4448 GEGURTET	230.9614
GL120	AE BZX79/B6V8 0,5W ZDI ZENER DIODE	AE	586.9906	PHILIPS-CO	BZX79/B6V8	230.9614
GL121 ...123	AD 1N4448 75V OA15 UDI DIODE	AD	012.0700	TEXAS INST	1N4448 GEGURTET	230.9614
GL125 ...129	AD 1N4448 75V OA15 UDI DIODE	AD	012.0700	TEXAS INST	1N4448 GEGURTET	230.9614
GL131 ...133	AD 1N4448 75V OA15 UDI DIODE	AD	012.0700	TEXAS INST	1N4448 GEGURTET	230.9614

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
J10	JD 100 UA 78X61 U METER	281.1185	GOSSEN	R&S.ZCHNG.281.1185	230.9350
K10	DY KABEL	230.9650			
K30	DY BANDKABEL 2-POLIG	230.9237			
K40	DY BANDKABEL 3-POLIG	230.9243			
K50	DY BANDKABEL 2-POLIG	230.9250			
K60	DY BANDKABEL 4-POLIG	230.9266			
K70	DY BANDKABEL 8-POLIG	230.9272			
L101	LD SPULE COIL	281.0950			230.9614
L102	LD SPULE COIL	281.0966			230.9614
L103	LD SPULE COIL	281.0972			230.9614
L104	LD SPULE COIL	281.0989			230.9614
L105	LD SPULE COIL	281.0950			230.9614
L106	LD SPULE COIL	281.0966			230.9614
L107	LD SPULE COIL	281.0972			230.9614
L108	LD SPULE COIL	281.0989			230.9614
L109	LD 100UH 10% 0,17A 5R2 CHOKE	026.3365	JAHRE	74.11-1000K	230.9614
L111	LD SPULE COIL	230.8882			230.9614
L112	LD SPULE COIL	230.8899			230.9614
L113	LD SPULE COIL	281.0995			230.9614
L114	LD SPULE COIL	281.0995			230.9614
MP101 ...109	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	230.9614
MP111	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	230.9614
MP112	FP STIFTLEISTE 36P.R2,54 PIN CONNECTOR	FP 279.1669	BINDER	742-5-11-0201-00-36	230.9614
MP113	FP STIFTLEISTE 36P.R2,54 PIN CONNECTOR	FP 279.1669	BINDER	742-5-11-0201-00-36	230.9614
Q101	EQ 4,256MHZ CL30P HC-36/U CRYSTAL 4,256MHZ	230.9137	KV-NECKAR	R&S-ZCHNG.053.9219	230.9614
R10	RL 0,60W 150 KOHM+-1%TK50 RESISTOR	RL 083.2129	DRALORIC	SMA/207/150K-F-C	
R101	RL 0,60W 22,1KOHM+-1%TK50 RESISTOR	RL 083.1545	DRALORIC	SMA/207/22,1K-F-C	230.9614
R102	RS 0,5W500 OHM+-10%10X10X CERMET POTENTIOMETER T	RS 247.7878	BOURNS	3386F-1-501	230.9614
R103	RL 0,60W 10,7KOHM+-1%TK50 RESISTOR	RL 083.1316	DRALORIC	SMA0207/10,7K-F-D	230.9614
R104	RL 0,60W 11,0KOHM+-1%TK50 RESISTOR	RL 083.1322	DRALORIC	SMA0207/11K-F-D	230.9614
R105	RL 0,60W 22,1KOHM+-1%TK50 RESISTOR	RL 083.1545	DRALORIC	SMA/207/22,1K-F-C	230.9614
R106	RL 0,60W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMA0207/100/HM-F-D	230.9614
R107	RL 0,35W4,99KOHM+-0,1%T25 RESISTOR	RL 084.2480	DRALORIC	SMA0207/4,99K-B-E	230.9614
R108	RL 0,60W 5,49KOHM+-1%TK50 RESISTOR	RL 083.1139	DRALORIC	SMA0207/5,49K-F-D	230.9614
R109	RL 0,60W 3,01KOHM+-1%TK50 RESISTOR	RL 083.0961	DRALORIC	SMA0207/3,01K-F-D	230.9614
R110	RL 0,60W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	230.9614
R111	RL 0,60W 4,99KOHM+-1%TK50 RESISTOR	RL 083.1116	DRALORIC	SMA0207/4,99K-F-D	230.9614
R112	RL 0,60W 2,21KOHM+-1%TK50 RESISTOR	RL 082.2477	DRALORIC	SMA 0207/2,21K-F-C	230.9614
R113	RL 0,60W 210 KOHM+-1%TK50 RESISTOR	RL 083.2258	DRALORIC	SMA0207/210K-F-C	230.9614

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R114	RL 0,60W 33,2KOHM+-1%TK50 RESISTOR	RL 083.1674	DRALORIC	SMA0207/33,2K-F-C	230.9614
R115	RL 0,60W 61,9KOHM+-1%TK RESISTOR	RL 082.6120	DRALORIC	SMA 0207/61,9K-F-C	230.9614
R116	RS 0,5W20KOHM+-10%10X10X5 CERMET POTENTIOMETER T	RS 087.7577	BOURNS	3386F-1-203	230.9614
R117	RL 0,60W 4,75KOHM+-1%TK50 RESISTOR	RL 083.1097	DRALORIC	SMA0207/4,75K-F-D	230.9614
R118	RS 0,5W10KOHM+-10%10X10X5 CERMET POTENTIOMETER T	RS 247.7903	BOURNS	3386F-1-103	230.9614
R121	RL 0,60W 22,1KOHM+-1%TK50 RESISTOR	RL 083.1545	DRALORIC	SMA/207/22,1K-F-C	230.9614
R122	RS 0,5W500 OHM+-10%10X10X CERMET POTENTIOMETER T	RS 247.7878	BOURNS	3386F-1-501	230.9614
R123	RL 0,60W 10,7KOHM+-1%TK50 RESISTOR	RL 083.1316	DRALORIC	SMA0207/10,7K-F-D	230.9614
R124	RL 0,60W 11,0KOHM+-1%TK50 RESISTOR	RL 083.1322	DRALORIC	SMA0207/11K-F-D	230.9614
R125	RL 0,60W 22,1KOHM+-1%TK50 RESISTOR	RL 083.1545	DRALORIC	SMA/207/22,1K-F-C	230.9614
R126	RL 0,60W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMA0207/100/HM-F-D	230.9614
R127	RL 0,35W4,99KOHM+-0,1%T25 RESISTOR	RL 084.2480	DRALORIC	SMA0207/4,99K-B-E	230.9614
R128	RL 0,60W 5,49KOHM+-1%TK50 RESISTOR	RL 083.1139	DRALORIC	SMA0207/5,49K-F-D	230.9614
R129	RL 0,60W 3,01KOHM+-1%TK50 RESISTOR	RL 083.0961	DRALORIC	SMA0207/3,01K-F-D	230.9614
R131	RL 0,60W 4,99KOHM+-1%TK50 RESISTOR	RL 083.1116	DRALORIC	SMA0207/4,99K-F-D	230.9614
R132	RL 0,60W 2,21KOHM+-1%TK50 RESISTOR	RL 082.2477	DRALORIC	SMA 0207/2,21K-F-C	230.9614
R133	RL 0,60W 210 KOHM+-1%TK50 RESISTOR	RL 083.2258	DRALORIC	SMA0207/210K-F-C	230.9614
R134	RL 0,60W 33,2KOHM+-1%TK50 RESISTOR	RL 083.1674	DRALORIC	SMA0207/33,2K-F-C	230.9614
R135	RL 0,35W 64,9KOHM+-1%TK50 RESISTOR TRIMMWERT	RL 083.1868	DRALORIC	SMA0207/64,9K-F-C	230.9614
R136	RS 0,5W20KOHM+-10%10X10X5 CERMET POTENTIOMETER T	RS 087.7577	BOURNS	3386F-1-203	230.9614
R137	RL 0,60W 4,75KOHM+-1%TK50 RESISTOR	RL 083.1097	DRALORIC	SMA0207/4,75K-F-D	230.9614
R141	RL 0,60W 316 OHM+-1%TK50 RESISTOR	RL 083.0232	DRALORIC	SMA0207/316OHM-F-D	230.9614
R142	RL 0,60W 976 OHM+-1%TK50 RESISTOR	RL 083.0603	DRALORIC	SMA0207/976OHM-F-D	230.9614
R143	RL 0,60W 4,87KOHM+-1%TK50 RESISTOR	RL 083.1100	DRALORIC	SMA0207/4,87K-F-D	230.9614
R144	RL 0,60W 9,76KOHM+-1%TK50 RESISTOR	RL 083.1280	DRALORIC	SMA0207/9,76K-F-D	230.9614
R145	RL 0,60W 48,7KOHM+-1%TK50 RESISTOR	RL 083.1816	DRALORIC	SMA/207/48,7K-F-C	230.9614
R146	RL 0,60W 124KOHM+-1%TK50 RESISTOR	RL 082.6072	DRALORIC	SMA0207/124OHM-F-C	230.9614
R147	RL 0,60W 107 OHM+-1%TK50 RESISTOR	RL 082.9807	DRALORIC	SMA0207/107OHM-F-D	230.9614
R148	RL 0,60W 316 OHM+-1%TK50 RESISTOR	RL 083.0232	DRALORIC	SMA0207/316OHM-F-D	230.9614
R149	RL 0,60W 1,62KOHM+-1%TK50 RESISTOR	RL 083.0755	DRALORIC	SMA0207/1,62K-F-D	230.9614
R151	RL 0,60W 3,24KOHM+-1%TK50 RESISTOR	RL 082.6843	DRALORIC	SMA0207/3,24K-F-D	230.9614
R152	RL 0,60W 19,1KOHM+-1%TK50 RESISTOR	RL 083.1500	DRALORIC	SMA/207/19,1K-F-C	230.9614
R153	RL 0,60W 73,2KOHM+-1%TK50 RESISTOR	RL 083.1900	DRALORIC	SMA0207/73,2K-F-C	230.9614
R154	RL 0,60W 100KOHM+-1%TK50 RESISTOR	RL 082.1764	DRALORIC	SMA0207/100K-F-C	230.9614
R155	RL 0,60W 475 OHM+-1%TK50 RESISTOR	RL 083.0390	DRALORIC	SMA0207/475OHM-F-D	230.9614
R156	RL 0,60W 1,82KOHM+-1%TK50 RESISTOR	RL 082.2277	DRALORIC	SMA0207/1,82K-F-C	230.9614
R157	RL 0,60W 274 OHM+-1%TK50 RESISTOR	RL 083.0178	DRALORIC	SMA0207/274OHM-F-D	230.9614
R158	RS 2K2 10% LIN 0,5W DEPOS.-CARBON POTENTIOMET	RS 087.7325	DRALORIC	61CDS 2,2KOHM10%LIN.	230.9614

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R159	RL 0,60W 100KOHM+-1%TK50 RESISTOR	RL 082.1764	DRALORIC	SMA0207/100K-F-C	230.9614
R161	RS 0,5W50KOHM+-10%10X10X5 CERMET POTENTIOMETER T	RS 247.7910	BOURNS	3386F-1-503	230.9614
R162	RL 0,60W 100KOHM+-1%TK50 RESISTOR	RL 082.1764	DRALORIC	SMA0207/100K-F-C	230.9614
R163	RL 0,60W1,21MOHM+-1%TK50 METALFILMRESISTOR	RL 099.8115	RESISTA	MK2 1,21MOHM 1% TK50	230.9614
R164	RL 0,60W 22,1KOHM+-1%TK50 RESISTOR	RL 083.1545	DRALORIC	SMA/207/22,1K-F-C	230.9614
R165	RL 0,60W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMA0207/100/HM-F-D	230.9614
R166	RL 0,60W 2.74MOHM+-1%TK50 METALFILMRESISTOR	RL 099.8980	RESISTA	MK2 2.74MOHM+-1%TK50	230.9614
R167	RL 0,60W 47,5KOHM+-1%TK50 RESISTOR	RL 083.1800	DRALORIC	SMA/207/47,5K-F-C	230.9614
R168	RL 0,60W 47,5KOHM+-1%TK50 RESISTOR	RL 083.1800	DRALORIC	SMA/207/47,5K-F-C	230.9614
R169	RL 0,60W 7,15KOHM+-1%TK50 RESISTOR	RL 083.1174	DRALORIC	SMA0207/7,15K-F-D	230.9614
R171	RL 0,60W 1,82KOHM+-1%TK50 RESISTOR TRIMMWERT	RL 082.2277	DRALORIC	SMA0207/1,82K-F-C	230.9614
R172	RL 0,60W 4,75KOHM+-1%TK50 RESISTOR	RL 083.1097	DRALORIC	SMA0207/4,75K-F-D	230.9614
R173	RL 0,60W 23,7KOHM+-1%TK50 RESISTOR	RL 083.1568	DRALORIC	SMA/207/23,7K-F-C	230.9614
R174	RS 0,5W5KOHM+-10%10X10X5 CERMET POTENTIOMETER T	RS 247.7890	BOURNS	3386F-1-502	230.9614
R175	RL 0,60W 6,81KOHM+-1%TK50 RESISTOR	RL 082.2560	DRALORIC	SMA 0207/6,81K-F-C	230.9614 R
R176	RF RICHTIGE SNR.0620.0318 RESISTOR	074.0904	BEYSCHLAG	SBC0309/10M5%	230.9614
R177	RS 0,5W100 OHM+-10%10X10X CERMET POTENTIOMETER T	RS 247.7984	BOURNS	3386F-1-101	230.9614
R178	RL 0,60W 12,1KOHM+-1%TK50 RESISTOR	RL 083.1351	DRALORIC	SMA0207/12,1K-F-D	230.9614
R179	RL 0,60W 15,0KOHM+-1%TK50 RESISTOR	RL 083.1400	DRALORIC	SMA0207/15K-F-D	230.9614
R181	RL 0,60W 1,21KOHM+-1%TK50 RESISTOR	RL 083.0655	DRALORIC	SMA0207/1,21K-F-D	230.9614
R182	RL 0,60W 2,21KOHM+-1%TK50 RESISTOR	RL 082.2477	DRALORIC	SMA 0207/2,21K-F-C	230.9614
R183	RL 0,60W 6,65KOHM+-1%TK50 RESISTOR	RL 082.2254	DRALORIC	SMA0207/6,65K-F-C	230.9614
R185	RL 0,35W976 OHM+-0,1%TK25 RESISTOR	RL 083.9123	DRALORIC	SMA/207/976OHM-B-E	230.9614
R186	RL 0,60W14,30 OHM+-1%TK50 RESISTOR	RL 082.9007	DRALORIC	SMA0207/14,3OHM-F-D	230.9614
R187	RL 0,60W 34,8 OHM+-1%TK50 RESISTOR	RL 082.9371	DRALORIC	SMA0207/34,8OHM-F-D	230.9614
R188	RL 0,35W2,74KOHM+-0,1%T25 RESISTOR	RL 083.9981	DRALORIC	SMA0207	230.9614
R189	RL 0,35W3,97KOHM+-0,1%T25 RESISTOR	RL 084.2297	DRALORIC	SMA0207	230.9614
R191	RL 0,60W 39,2 OHM+-1%TK50 RESISTOR	RL 082.9420	DRALORIC	SMA0207/39,2OHM-F-D	230.9614
R192	RL 0,60W30,10 OHM+-1%TK50 RESISTOR	RL 082.9313	DRALORIC	SMA0207/30,1OHM-F-D	230.9614
R193	RL 0,35W4,42KOHM+-0,1%T25 RESISTOR	RL 084.2380	DRALORIC	SMA0207	230.9614
R194	RL 0,35W3,97KOHM+-0,1%T25 RESISTOR	RL 084.2297	DRALORIC	SMA0207	230.9614
R195	RL 0,60W 39,2 OHM+-1%TK50 RESISTOR	RL 082.9420	DRALORIC	SMA0207/39,2OHM-F-D	230.9614
R196	RL 0,60W 34,8 OHM+-1%TK50 RESISTOR	RL 082.9371	DRALORIC	SMA0207/34,8OHM-F-D	230.9614
R197	RL 0,35W2,74KOHM+-0,1%T25 RESISTOR	RL 083.9981	DRALORIC	SMA0207	230.9614
R198	RL 0,35W976 OHM+-0,1%TK25 RESISTOR	RL 083.9123	DRALORIC	SMA/207/976OHM-B-E	230.9614
R199	RL 0,60W14,30 OHM+-1%TK50 RESISTOR	RL 082.9007	DRALORIC	SMA0207/14,3OHM-F-D	230.9614
R201	RL 0,35W10,0KOHM+-0,1%T25 RESISTOR	RL 084.3064	DRALORIC	SMA0207/10K-B-E	230.9614
R202	RL 0,35W8,98KOHM+-0,1%T25 RESISTOR	RL 084.2974	DRALORIC	SMA0207/8,98K-B-E	230.9614

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R203	RL 0,60W 78,7 OHM+-1%TK50 RESISTOR	RL 082.9688	DRALORIC	SMA0207/78,7OHM-F-D	230.9614
R204	RL 0,35W6,90KOHM+-0,1%T25 RESISTOR	RL 084.2751	DRALORIC	SMA0207	230.9614
R205	RL 0,60W 43,2 OHM+-1%TK50 RESISTOR	RL 082.9465	DRALORIC	SMA0207/43,2OHM-F-D	230.9614
R206	RL 0,35W5,23KOHM+-0,1%T25 RESISTOR	RL 084.2522	DRALORIC	SMA/207/5,23K-B-E	230.9614
R207	RL 0,60W17,40 OHM+-1%TK50 RESISTOR	RL 082.9088	DRALORIC	SMA0207/17,4OHM-F-D	230.9614
R208	RL 0,35W5,23KOHM+-0,1%T25 RESISTOR	RL 084.2522	DRALORIC	SMA/207/5,23K-B-E	230.9614
R209	RL 0,60W17,40 OHM+-1%TK50 RESISTOR	RL 082.9088	DRALORIC	SMA0207/17,4OHM-F-D	230.9614
R211	RL 0,35W6,90KOHM+-0,1%T25 RESISTOR	RL 084.2751	DRALORIC	SMA0207	230.9614
R212	RL 0,60W 43,2 OHM+-1%TK50 RESISTOR	RL 082.9465	DRALORIC	SMA0207/43,2OHM-F-D	230.9614
R213	RL 0,35W8,98KOHM+-0,1%T25 RESISTOR	RL 084.2974	DRALORIC	SMA0207/8,98K-B-E	230.9614
R214	RL 0,60W 78,7 OHM+-1%TK50 RESISTOR	RL 082.9688	DRALORIC	SMA0207/78,7OHM-F-D	230.9614
R215	RL 0,35W10,0KOHM+-0,1%T25 RESISTOR	RL 084.3064	DRALORIC	SMA0207/10K-B-E	230.9614
R216	RS 0,5W10KOHM+-10%10X10X5 CERMET POTENTIOMETER T	RS 247.7903	BOURNS	3386F-1-103	230.9614
R217	RS 0,5W10KOHM+-10%10X10X5 CERMET POTENTIOMETER T	RS 247.7903	BOURNS	3386F-1-103	230.9614
R218	RL 0,60W 100KOHM+-1%TK50 RESISTOR	RL 082.1764	DRALORIC	SMA0207/100K-F-C	230.9614
R219	RL 0,60W 100KOHM+-1%TK50 RESISTOR	RL 082.1764	DRALORIC	SMA0207/100K-F-C	230.9614
R221	RL 0,60W 475 KOHM+-1%TK50 RESISTOR	RL 083.2593	DRALORIC	SMA0207/475K-F-C	230.9614
R222	RL 0,60W 475 KOHM+-1%TK50 RESISTOR	RL 083.2593	DRALORIC	SMA0207/475K-F-C	230.9614
R223	RL 0,60W 100KOHM+-1%TK50 RESISTOR	RL 082.1764	DRALORIC	SMA0207/100K-F-C	230.9614
R224	RL 0,60W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	230.9614
R225	RL 0,60W 4,99KOHM+-1%TK50 RESISTOR	RL 083.1116	DRALORIC	SMA0207/4,99K-F-D	230.9614
R226	RL 0,60W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	230.9614
R227	RL 0,60W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	230.9614
R228	RL 0,60W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	230.9614
R229	RL 0,60W 10,5KOHM+-1%TK50 RESISTOR	RL 083.1300	DRALORIC	SMA0207/10,5K-F-D	230.9614
R231	RS 0,5W2KOHM+-10%10X10X5 CERMET POTENTIOMETER T	RS 247.7884	BOURNS	3386F-1-202	230.9614
R232	RL 0,60W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMA0207/100/HM-F-D	230.9614
R233	RL 0,60W 22,1KOHM+-1%TK50 RESISTOR	RL 083.1545	DRALORIC	SMA/207/22,1K-F-C	230.9614
R234	RL 0,60W 3,32KOHM+-1%TK50 RESISTOR	RL 083.0990	DRALORIC	SMA0207/3,32K-F-D	230.9614
R235	RL 0,60W 150 OHM+-1%TK50 RESISTOR	RL 082.9942	DRALORIC	SMA0207/150OHM-F-D	230.9614
R236	RL 0,60W 10,0 OHM+-1%TK50 RESISTOR	RL 082.8852	DRALORIC	SMA0207/100HM-F-D	230.9614
R237	RL 0,60W 10,0 OHM+-1%TK50 RESISTOR	RL 082.8852	DRALORIC	SMA0207/100HM-F-D	230.9614
R238	RL 0,60W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMA0207/100/HM-F-D	230.9614
R239	RL 0,60W 22,1KOHM+-1%TK50 RESISTOR	RL 083.1545	DRALORIC	SMA/207/22,1K-F-C	230.9614
R240	RL 0,60W 121KOHM+-1%TK50 RESISTOR	RL 083.2070	DRALORIC	SMA/207/121K-F-C	230.9614
R241	RL 0,60W 3,32KOHM+-1%TK50 RESISTOR	RL 083.0990	DRALORIC	SMA0207/3,32K-F-D	230.9614
R242	RL 0,60W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMA0207/100/HM-F-D	230.9614
R243	RL 0,60W 100KOHM+-1%TK50 RESISTOR	RL 082.1764	DRALORIC	SMA0207/100K-F-C	230.9614
R244	RL 0,60W 47,5KOHM+-1%TK50 RESISTOR	RL 083.1800	DRALORIC	SMA/207/47,5K-F-C	230.9614

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R245	RL 0,60W 4,75KOHM+-1%TK50 RESISTOR	RL 083.1097	DRALORIC	SMA0207/4,75K-F-D	230.9614
R246	RL 0,60W 2,21KOHM+-1%TK50 RESISTOR	RL 082.2477	DRALORIC	SMA 0207/2,21K-F-C	230.9614
R247	RL 0,60W 2,21KOHM+-1%TK50 RESISTOR	RL 082.2477	DRALORIC	SMA 0207/2,21K-F-C	230.9614
R248	RL 0,60W 2,21KOHM+-1%TK50 RESISTOR	RL 082.2477	DRALORIC	SMA 0207/2,21K-F-C	230.9614
R250	RS 0,5W200 OHM+-10%10X10X CERMET POTENTIOMETER T	RS 087.7554	BOURNS	3386F-1-201	230.9614
R251	RL 0,60W 475 KOHM+-1%TK50 RESISTOR	RL 083.2593	DRALORIC	SMA0207/475K-F-C	230.9614
R252	RL 0,60W8,25MOHM+-1%TK50 FILM-RESISTOR	RL 007.3792	RESISTA	MK2 8,25MOHM 1% TK50	230.9614
R253	RL 0,60W 2,21KOHM+-1%TK50 RESISTOR	RL 082.2477	DRALORIC	SMA 0207/2,21K-F-C	230.9614
R254	RL 0,60W 301 OHM+-1%TK50 RESISTOR	RL 083.0210	DRALORIC	SMA0207/301OHM-F-D	230.9614
R255	RL 0,60W 4,99KOHM+-1%TK50 RESISTOR	RL 083.1116	DRALORIC	SMA0207/4,99K-F-D	230.9614
R256	RL 0,60W 1,82KOHM+-1%TK50 RESISTOR	RL 082.2277	DRALORIC	SMA0207/1,82K-F-C	230.9614
R257	RL 0,60W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMA0207/100/HM-F-D	230.9614
R258	RL 0,60W 22,1KOHM+-1%TK50 RESISTOR	RL 083.1545	DRALORIC	SMA/207/22,1K-F-C	230.9614
R259	RL 0,60W 27,4KOHM+-1%TK50 RESISTOR	RL 082.2583	DRALORIC	SMA 0207/27,4K-F-C	230.9614
R261	RL 0,60W 39,2KOHM+-1%TK50 RESISTOR	RL 083.1745	DRALORIC	SMA/207/39,2K-F-C	230.9614
R262	RL 0,60W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMA0207/100/HM-F-D	230.9614
R263	RL 0,60W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	230.9614
R264	RL 0,60W 3,92KOHM+-1%TK50 RESISTOR	RL 083.1039	RESISTA	MK2	230.9614
R265	RL 0,60W 3,32KOHM+-1%TK50 RESISTOR	RL 083.0990	DRALORIC	SMA0207/3,32K-F-D	230.9614
R266	RS 10K 10% LIN 0,5W DEPOS.-CARBON POTENTIOMET	RS 087.7348	DRALORIC	61CDP10K10%LIN L32	230.9614
R267	RL 0,60W 4,75KOHM+-1%TK50 RESISTOR	RL 083.1097	DRALORIC	SMA0207/4,75K-F-D	230.9614
R268	RS 0,5W2KOHM+-10%10X10X5 CERMET POTENTIOMETER T	RS 247.7884	BOURNS	3386F-1-202	230.9614
R269	RL 0,60W 22,1KOHM+-1%TK50 RESISTOR	RL 083.1545	DRALORIC	SMA/207/22,1K-F-C	230.9614
R271	RS 10K 10% LIN 0,5W DEPOS.-CARBON POTENTIOMET	RS 087.7348	DRALORIC	61CDP10K10%LIN L32	230.9614
R272	RL 0,60W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	230.9614
R273	RL 0,60W 3,92KOHM+-1%TK50 RESISTOR	RL 083.1039	RESISTA	MK2	230.9614
R274	RS 0,5W10KOHM+-10%10X10X5 CERMET POTENTIOMETER T	RS 247.7903	BOURNS	3386F-1-103	230.9614
R276	RL 0,35W 511 OHM+-1%TK50 RESISTOR	RL 083.0426	DRALORIC	SMA0207/511OHM-F-D	230.9614
R277	RL 0,60W 536 OHM+-1%TK50 RESISTOR	RL 083.0449	DRALORIC	SMA0207/536OHM-F-D	230.9614
R278	RL 0,60W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	230.9614
R279	RL 0,60W 20,0KOHM+-1%TK50 RESISTOR	RL 083.1522	DRALORIC	SMA/207/20K-F-C	230.9614
R281	RL 0,60W 20,0KOHM+-1%TK50 RESISTOR	RL 083.1522	DRALORIC	SMA/207/20K-F-C	230.9614
R282	RL 0,60W 20,0KOHM+-1%TK50 RESISTOR	RL 083.1522	DRALORIC	SMA/207/20K-F-C	230.9614
R283	RL 0,60W 2,21KOHM+-1%TK50 RESISTOR	RL 082.2477	DRALORIC	SMA 0207/2,21K-F-C	230.9614
R284	RL 0,60W 2,21KOHM+-1%TK50 RESISTOR	RL 082.2477	DRALORIC	SMA 0207/2,21K-F-C	230.9614
R285	RL 0,60W 2,21KOHM+-1%TK50 RESISTOR	RL 082.2477	DRALORIC	SMA 0207/2,21K-F-C	230.9614
R286	RL 0,60W 1,50KOHM+-1%TK50 RESISTOR	RL 083.0732	DRALORIC	SMA0207/1,50K-F-D	230.9614
R287	RL 0,60W 12,1KOHM+-1%TK50 RESISTOR	RL 083.1351	DRALORIC	SMA0207/12,1K-F-D	230.9614
R288	RL 0,60W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	230.9614

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R289	RL 0,60W 20,0KOHM+-1%TK50 RESISTOR	RL 083.1522	DRALORIC	SMA/207/20K-F-C	230.9614
R291	RL 0,60W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMAO207/100/HM-F-D	230.9614
R292	RL 0,60W 21,0KOHM+-1%TK50 RESISTOR	RL 083.1539	DRALORIC	SMA/207/21,0K-F-C	230.9614
R293	RL 0,60W 22,1KOHM+-1%TK50 RESISTOR	RL 083.1545	DRALORIC	SMA/207/22,1K-F-C	230.9614
R294	RL 0,60W 3,32KOHM+-1%TK50 RESISTOR	RL 083.0990	DRALORIC	SMAO207/3,32K-F-D	230.9614
R295	RL 0,60W 150 OHM+-1%TK50 RESISTOR	RL 082.9942	DRALORIC	SMAO207/150OHM-F-D	230.9614
R296	RS 2K2 10% LIN 0,5W DEPOS.-CARBON POTENTIOMET	RS 087.7325	DRALORIC	61CDS 2,2KOHM10%LIN.	230.9614
R298	RL 0,60W 475 OHM+-1%TK50 RESISTOR	RL 083.0390	DRALORIC	SMAO207/475OHM-F-D	230.9614
R299	RF 0,5 W120 OHM+-5% DEPOS.-CARBON RESISTOR	007.1260	RESISTA	SK4/120OHM5%	230.9614
R301	RL 0,60W 2,74KOHM+-1%TK50 RESISTOR	RL 083.0926	DRALORIC	SMAO207/2,74K-F-D	230.9614
R302	RL 0,60W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMAO207/10K-F-D	230.9614
R303	RL 0,60W 10,0 OHM+-1%TK50 RESISTOR	RL 082.8852	DRALORIC	SMAO207/100HM-F-D	230.9614
R304	RF 0,5 W100 OHM+-5% DEPOS.-CARBON RESISTOR	007.1254	RESISTA	SK4/1000HM5%	230.9614
R305	RL 0,60W 2,21KOHM+-1%TK50 RESISTOR	RL 082.2477	DRALORIC	SMA 0207/2,21K-F-C	230.9614
RL10	EF SIGNALLEUCHTE 24V GN PILOT LAMP 24 V GREEN	EF 086.5741	MEINERT	SGF6/1C,24V,35MA,GRU	230.9350
RL20	EG SIGNALLEUCHTE ROT PILOT LAMP RED	EG 070.0751	MEINERT	SGF6/1LO.W.TRANSP.	230.9350
S10	SB NETZSCHALTER 2XU O.KN. POWER SWITCH	SB 007.5143	ITT	SF OKN NE18 2 U E E	230.9350
S20	SK SCHIEBESCH.2STELGLG 2K SLIDE SWITCH	020.0370	EBE	MF2U	230.9350
S101	SD 3EBENEN 2MAL 6 UNTERBR SD SWITCH	SD 230.8830	SEL	SBL11 3 2E37A06U	230.9614
S102	SD 1EBENE 2MAL 6 UNTERBR SD SWITCH	SD 230.8853	SEL	SBL11 1 2E61A06U	230.9614
S103	SB DRUCKSCH.2XU KNOPF GR SB DRUCKSCH.2XU KNOB GR	SB 230.9643	SCHADOW	230.9643 R&S-K-BLATT	230.9614
S104	SD 1EBENE 4MAL 3 UNTERBR SD FLACHSCH.1E 4X30	SD 230.8860	SEL	R&S.ZCHNG.230.8860	230.9614
S105	SB DRUCKSCH.2XU KNOPF GR SB DRUCKSCH.2XU KNOB GR	SB 230.9643	SCHADOW	230.9643 R&S-K-BLATT	230.9614
S106	SD 1EBENE 3MAL 4 UNTERBR SD SWITCH	SD 230.8847	SEL	SBL11 1 3E61A04U	230.9614
SI10	SS SCHMELZS.T80 DIN41662 FUSE FUER 220V SCHMELZS.T160B FUER 110V SS 020.7217	SS 020.7117	WICKMANN	T0,08 DIN 41662 TROP	
ST10	FN GERAETEST. 2POL.+SCHU. RECEPTACLE	FN 092.3930	KLAR&BEILS	42R02.3222 20	230.9450
ST101	FM WINKELSTECKERL.30P. GS 30-PIN INSERT	FM 284.9435	AMPHENOL	T2070092	230.9614
ST102	FP STIFTLEISTE 36P.R2,54 PIN CONNECTOR 7-POLIG	FP 242.3600	BINDER	742-5-11-0178-00-36	230.9614
ST103	FP STIFTLEISTE 36P.R2,54 PIN CONNECTOR 2-POLIG	FP 242.3600	BINDER	742-5-11-0178-00-36	230.9614
ST104	FP STIFTLEISTE 36P.R2,54 PIN CONNECTOR 3-POLIG	FP 242.3600	BINDER	742-5-11-0178-00-36	230.9614
ST105	FP STIFTLEISTE 36P.R2,54 PIN CONNECTOR 8-POLIG	FP 242.3600	BINDER	742-5-11-0178-00-36	230.9614
ST106	FP STIFTLEISTE 36P.R2,54 PIN CONNECTOR 8-POLIG	FP 242.3600	BINDER	742-5-11-0178-00-36	230.9614
ST107	FP STIFTLEISTE 36P.R2,54 PIN CONNECTOR 2-POLIG	FP 242.3600	BINDER	742-5-11-0178-00-36	230.9614
ST108	FP STIFTLEISTE 36P.R2,54 PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	230.9614

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
	7-POLIG				
T101	AM BF245A N-D 30V JFET FET	AM 010.8527	PHILIPS-CO	BF245A	230.9614
T102	AM BF245A N-D 30V JFET FET	AM 010.8527	PHILIPS-CO	BF245A	230.9614
T103	AK BCY79IX P 45V 200MA TRANSISTOR	AK 010.3777	PHILIPS-CO	BCY79IX	230.9614
T104	AK BCY59IX N 45V 200MA TRANSISTOR	AK 010.5163	PHILIPS-CO	BCY59IX	230.9614
T105	AK BCY59IX N 45V 200MA TRANSISTOR	AK 010.5163	PHILIPS-CO	BCY59IX	230.9614
T106 ..109	AM 2N4860 N-D 30V JFET FET	234.4075	PHILIPS-CO	2N4860	230.9614
T111 ..114	AM 2N4860 N-D 30V JFET FET	234.4075	PHILIPS-CO	2N4860	230.9614
T115	AK BCY59IX N 45V 200MA TRANSISTOR	AK 010.5163	PHILIPS-CO	BCY59IX	230.9614
T116	AK BCY59IX N 45V 200MA TRANSISTOR	AK 010.5163	PHILIPS-CO	BCY59IX	230.9614
T117	AK BCY79IX P 45V 200MA TRANSISTOR	AK 010.3777	PHILIPS-CO	BCY79IX	230.9614
T118	AK BCY59IX N 45V 200MA TRANSISTOR	AK 010.5163	PHILIPS-CO	BCY59IX	230.9614
T119	AK BCY59IX N 45V 200MA TRANSISTOR	AK 010.5163	PHILIPS-CO	BCY59IX	230.9614
T121	AK BCY79IX P 45V 200MA TRANSISTOR	AK 010.3777	PHILIPS-CO	BCY79IX	230.9614
T122	AM 2N4860 N-D 30V JFET FET	234.4075	PHILIPS-CO	2N4860	230.9614
T123	AK BCY59IX N 45V 200MA TRANSISTOR	AK 010.5163	PHILIPS-CO	BCY59IX	230.9614
T124	AK BCY59IX N 45V 200MA TRANSISTOR	AK 010.5163	PHILIPS-CO	BCY59IX	230.9614
T125	AK BSX26 N 15V 500MA TRANSISTOR	AK 010.4667	SGS	BSX26	230.9614
T126	AK BSX26 N 15V 500MA TRANSISTOR	AK 010.4667	SGS	BSX26	230.9614
T127 ..129	AK BCY59IX N 45V 200MA TRANSISTOR	AK 010.5163	PHILIPS-CO	BCY59IX	230.9614
T131 ..133	AK BCY59IX N 45V 200MA TRANSISTOR	AK 010.5163	PHILIPS-CO	BCY59IX	230.9614
T134	AK BCY79IX P 45V 200MA TRANSISTOR	AK 010.3777	PHILIPS-CO	BCY79IX	230.9614
T135	AK BCY59IX N 45V 200MA TRANSISTOR	AK 010.5163	PHILIPS-CO	BCY59IX	230.9614
T136	AK BSY56 N 80V 500MA TRANSISTOR	AK 010.5511	INTERMETAL	BSY56	230.9614
T137	AK BCY79IX P 45V 200MA TRANSISTOR	AK 010.3777	PHILIPS-CO	BCY79IX	230.9614
T138	AK BSY56 N 80V 500MA TRANSISTOR	AK 010.5511	INTERMETAL	BSY56	230.9614
TR10	LT NETZTRAFO POWER TRANSFORMER	281.1179			
X10	LD NETZF. 4A 50DB/10MHZ POWER FILTER COIL	347.2231	SIEMENS	B84150-A-A40	230.9450
Y10	ED REGELTEIL +12V,-12V CONTROL UNIT +12V,-12V	230.8918			
Y20	GC003-Z SCA-MODULATOR	230.9014			
	EMPFOHLENES ZUBEHOER				
					- ENDE -

ROHDE & SCHWARZ MÜNCHEN	ÄZ	Datum	Schaltteilliste für		Sachnummer		Blatt Nr.
	01	1278	REGELTEIL +12V,-12V	Z	230.8918	SA	1

Kennzeichen	Benennung / Beschreibung	Sachnummer	enthalten in
B401	BO MA748C OP-AMP TEXAS IC-SN72748P	BO 247.6542	230.8918
B402	BO MA748C OP-AMP TEXAS IC-SN72748P	BO 247.6542	230.8918
C401	CE 100UF-10+100%40V 13X17 SIEMENS B41316-B7107-Z	CE 022.7595	230.8918
C402	CE 470UF-10+100%40V 15X30 ROEDERST ELKO EK470/40	CE 087.0572	230.8918
BIS C405	CE 470UF-10+100%40V 15X30 ROEDERST ELKO EK470/40	CE 087.0572	230.8918
C406	CC 5 PF+-0,5 PF5P100 DRALORIC P100/IB5/0,5SDPN	CC 006.0083	230.8918
C407	CE 22UF -10+100%40V 9X13 SIEMENS B4136-B7226-Z	CE 022.7572	230.8918
C408	CE 22UF -10+100%40V 9X13 SIEMENS B4136-B7226-Z	CE 022.7572	230.8918
C409	CE 100UF-10+100%40V 13X17 SIEMENS B41316-B7107-Z	CE 022.7595	230.8918
C410	CC 5 PF+-0,5 PF5P100 DRALORIC P100/IB5/0,5SDPN	CC 006.0083	230.8918
C411	CE 100UF-10+100%40V 13X17 SIEMENS B41316-B7107-Z	CE 022.7595	230.8918
GL401	AG B60C800SIO,8A60V AEG-TELEF GLEICHRB60C800SI	AG 013.2042	230.8918
GL402	AG B60C800SIO,8A60V AEG-TELEF GLEICHRB60C800SI	AG 013.2042	230.8918
GL403	AG 1N4007 SI 1A 1000V AEG-TELEF 1N4007	AG 013.0310	230.8918
GL404	AE 1N827 6,2V REF.ELEM. MOTOROLA REFERENZDIODE1N827	AE 418.0029	230.8918
R401	RF 0,25W 4,7 OHM +-5% DRALORIC LCA0207/+-5%4,7	RF 074.0033	230.8918
R402	RF 0,25W 4,7 OHM +-5% DRALORIC LCA0207/+-5%4,7	RF 074.0033	230.8918
R403	RF 0,25W100 OHM +-5% DRALORIC LCA0207/+-5%100	RF 069.1012	230.8918
R404	RF 0,25W100 OHM +-5% DRALORIC LCA0207/+-5%100	RF 069.1012	230.8918
R405	RF 0,25W4,7KOHM +-5% DRALORIC LCA0207/+-5%4,7K	RF 069.4728	230.8918
R406	RS 0,5W1KOHM+-20%10X10X5 BOURNS 3386F-1-102	RS 087.7560	230.8918
R407	RF 0,25W5,1KOHM +-5% DRALORIC LCA0207/+-5%5,1K	RF 069.5124	230.8918
R408	RF 0,25W680 OHM +-5% DRALORIC LCA0207/+-5%680	RF 069.6814	230.8918
R409	RF 0,25W6,2KOHM +-5% DRALORIC LCA0207/+-5%6,2K	RF 069.6220	230.8918
R411	RS 0,5W1KOHM+-20%10X10X5 BOURNS 3386F-1-102	RS 087.7560	230.8918
R412	RF 0,25W 12KOHM +-5% DRALORIC LCA0207/+-5%12K	RF 069.1235	230.8918

Diese Unterlage ist unser Eigentum. Vervielfältigung, unbefugte Verwertung, Mitteilung an andere ist strafbar und schadenersatzpflichtig.

ROHDE & SCHWARZ MÜNCHEN	ÄZ	Datum	Schaltteilliste für		Sachnummer		Blatt Nr.
	01	1278	REGELTEIL +12V,-12V	Z	230.8918	SA	2

Kennzeichen	Benennung / Beschreibung	Sachnummer	enthalten in
ST401	FP INDIREKT.STECKERL.36P. BERG NR75160-102 5-POLIG	FP 242.3600	230.8918
ST402	FP INDIREKT.STECKERL.36P. BERG NR75160-102 8-POLIG	FP 242.3600	230.8918
T401	AL 2N4911 SINPN60V4A MOTOROLA TRANSISTOR 2N4911	AL 080.4395	230.8918
T402	AL 2N4911 SINPN60V4A MOTOROLA TRANSISTOR 2N4911	AL 080.4395	230.8918
			- ENDE -

Diese Unterlage ist urheberrechtlich geschützt. Vervielfältigung, unbefugte Verwertung, Mitteilung an andere ist strafbar und schadenersatzpflichtig.

Liste		Benennung / Beschreibung	Z	Kurztext	Sachnummer (VAR)	Äl FP	DIN A	Blatt Nr.
STUECKLISTE		ZUBEH./ACCESS. MSC2	Z		230.9589			1

Aussteller Konstr.	Äl ST	Änd. Mittlg.	Datum	Name	Schaltteilliste	Aussteller Fertigungsplan	Fertigungsvorschrift	Stückzahlbereich	K.-St.	Werk
2KAM KZ	F	38596	0287	DP						

enthalten in Sachnummer	Datum	Name	Strf. bzw. Stg. pro Los	Datum	Priorität	Los-Nr.	Stückzahl
230.9314				977	3EPF		

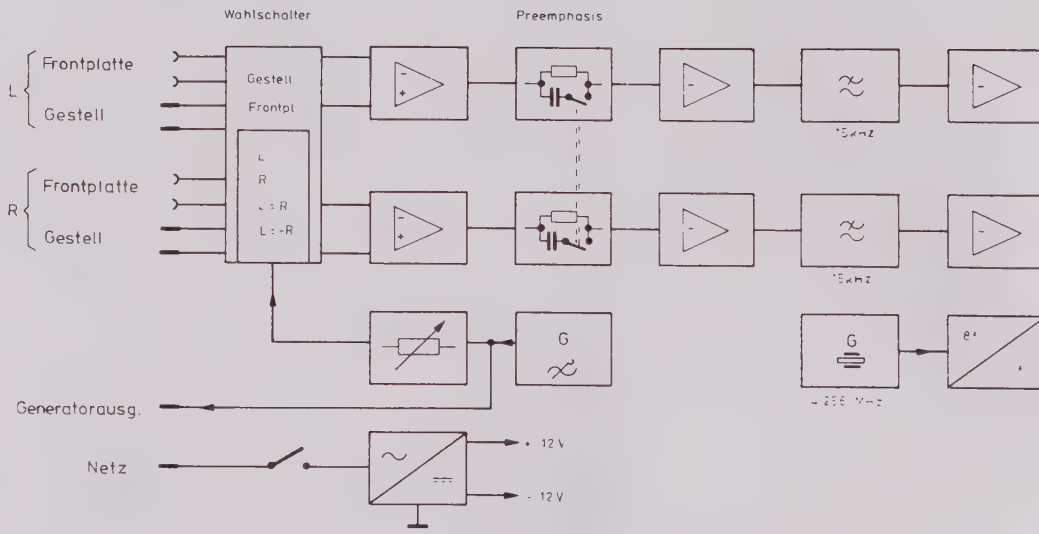
zugehöriges Verzeichnis	Teile/Strf. Teile/Stange	Losgröße	Dispo Art	DLZ	Lager Ort
230.9314 MSC2 STEREOMESSCODER					

Arbg. Nr.	Lfd.-Nr. / Termin	Menge / K.-St.	ME	Kennzeichen / Arb.-Pl.-Gr.	Benennung / Beschreibung / Arbeitsgang	Z	Kurztext / B	Sachnummer (VAR) / Werkzeug-Nr.	LGr.	Besch. Art AK / tr	Einbau-Code / te
	10	000	S		OHNE ZEICHN./NO SPEC.DRAW			999.9710			
	1				ZU/FOR *230.9314.03						
	2				**********						
	20	100	S		BESCHREIBUNG/MANUAL			230.9608		FOA	
	1				OZ						
	30	200	S		SS SCHMELZS.T80 DIN41662		SS	020.7117		B1E	N
	1				FUSE						
	40	200	S		SS SCHMELZS.T160 DIN41662		SS	020.7217		B1E	N
	1				FUSE						
	50	100	S		EG SIGNALLEUCHTE ROT		EG	070.0751		B1B	
	1				LAMPE/LAMP						
	60	100	S		EF SIGNALLEUCHTE 24V GN		EF	086.5741		B0B	
	1				LAMPE/LAMP						
	80	100	S		DS ANSCHL.KAB.M.SCHUKO-A.		DS	025.2365		B1B	
	1				CONNECTING CABLE						
	100	200	S		OK SCHLITZKNOPF		OK	061.8960		F5A	
	1				SLOTTED PUTTON						
	110	100	S		ZUBEHOERLISTE			230.9472		F3A	
										ENDE	

Werk: München 10, Teisnach 12, Memmingen 20

Mengeneinheit ME: Stück = S, Gramm = G, Kilogr. = K; mm = W, m = M, mm² = D; cm² = C, m² = Q, cm³ = Y; Liter = L

VAR = Variantenkennzahl, Äl = Änderungsindex, DLZ = Durchlaufzeit



Diese Zeichnung ist unser Eigentum. Vervielfältigung unbefugte Verwertung, Mitteilung an andere ist strafbar und schadenersatzpflichtig

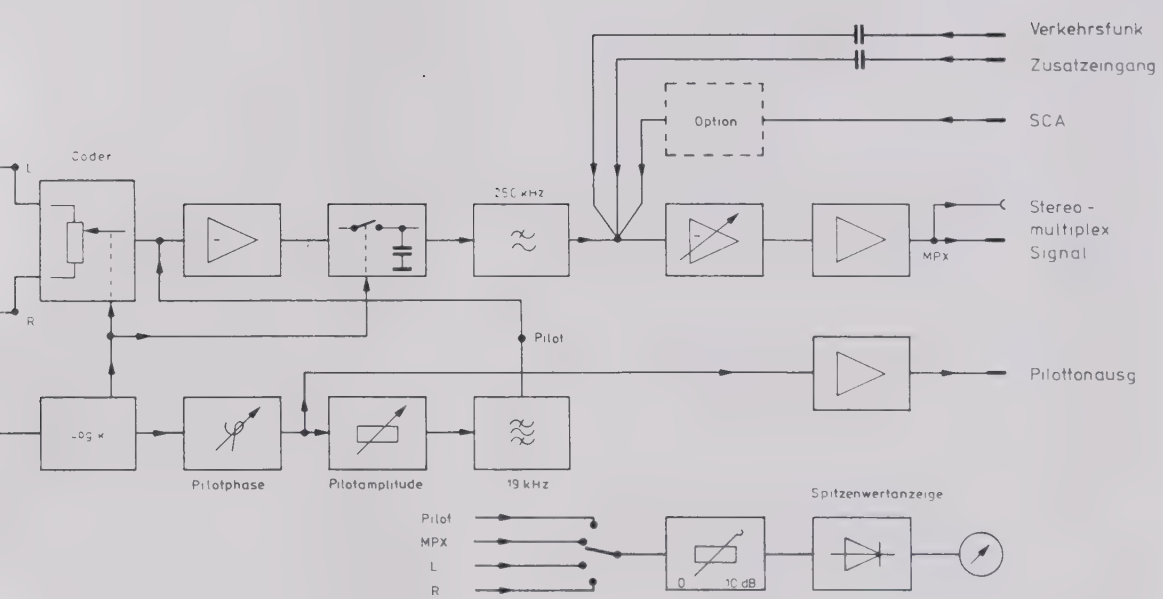
ROHDE & SCHWARZ MÜNCHEN

Zeichn.-Nr. 230 9314 FS

	Datum	Name
gezeichnet	2 79	Ba
überarbeitet	2 79	ST
geprüft		
normgeprüft		

1FME

PF 095 4109



0 1 2 3
ZENTIMETER

Stromlauf zu

Stereomeßcoder MSC 2

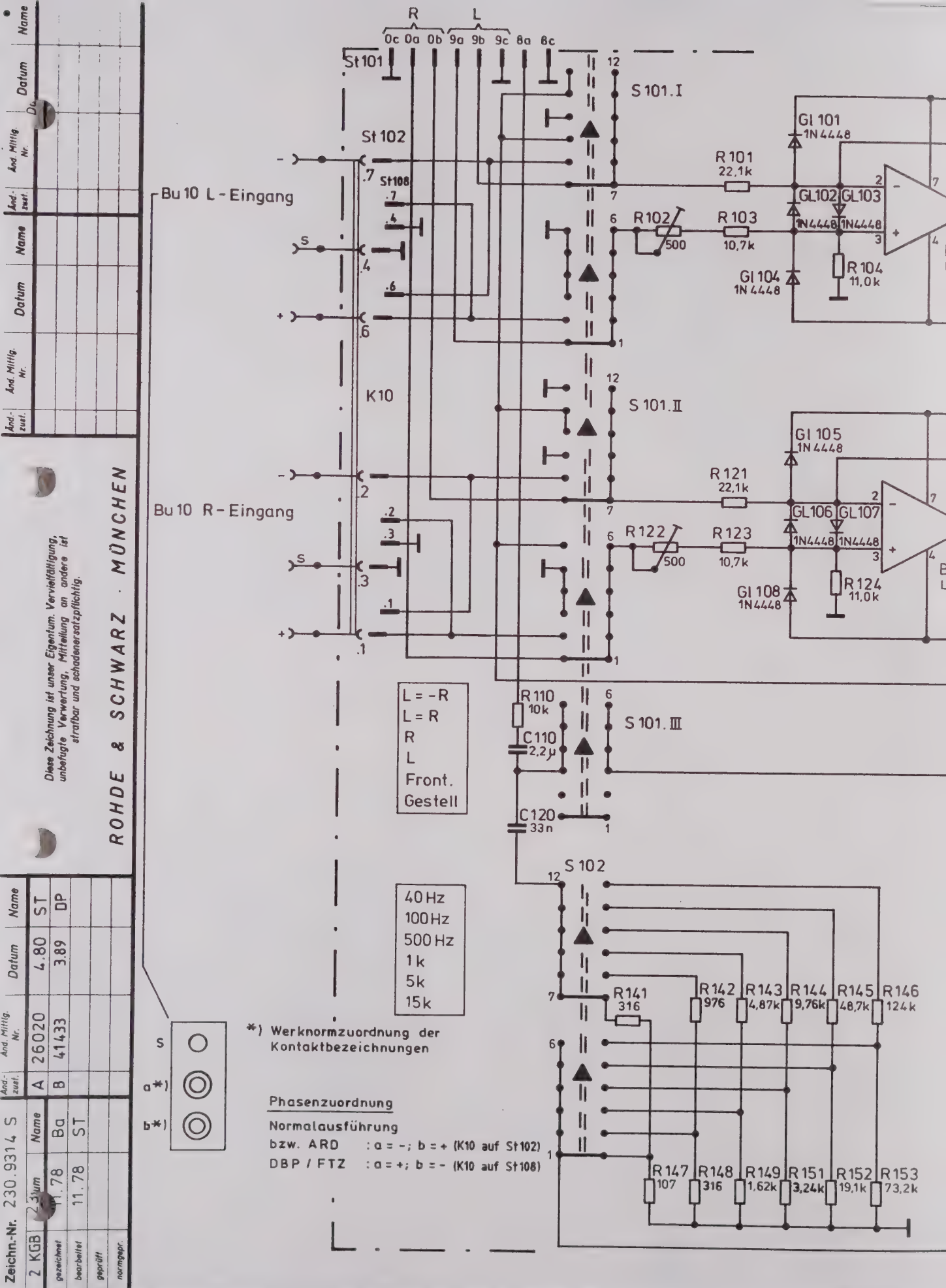
Zeichn Nr 230 9314 FS

reg i V 230 9314

erste Z

PGM 15 17

Klebekante für Druckerzeugnis; durch diese Zone möglichst nur Leitungen führen



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ROHDE & SCHWARZ · MÜNCHEN

Änd.-zust.	And. Mitteilg. Nr.	Datum	Name
A	26020	4.80	ST
B	41433	3.89	DP

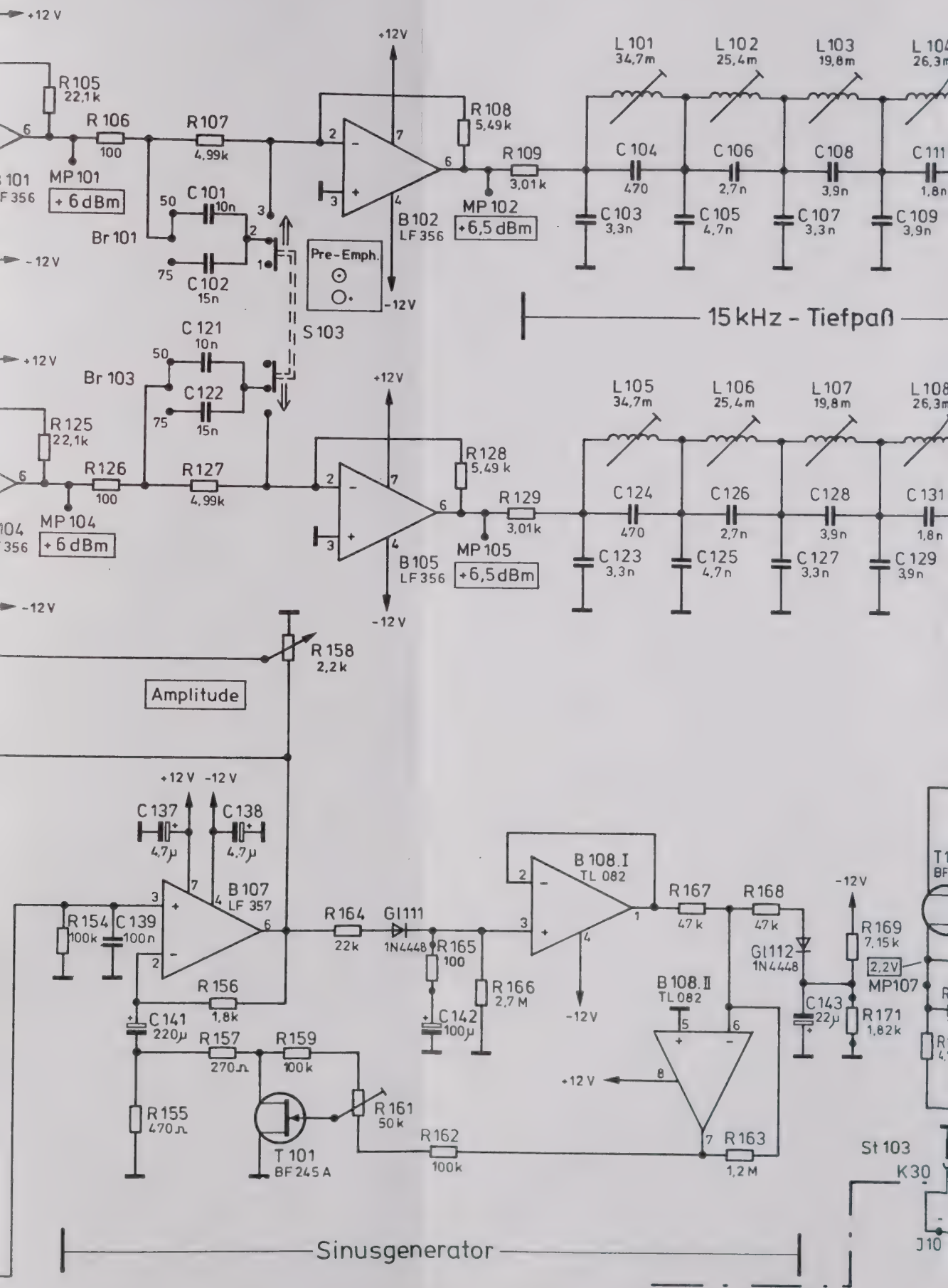
Zeichn.-Nr. 230.9314 S

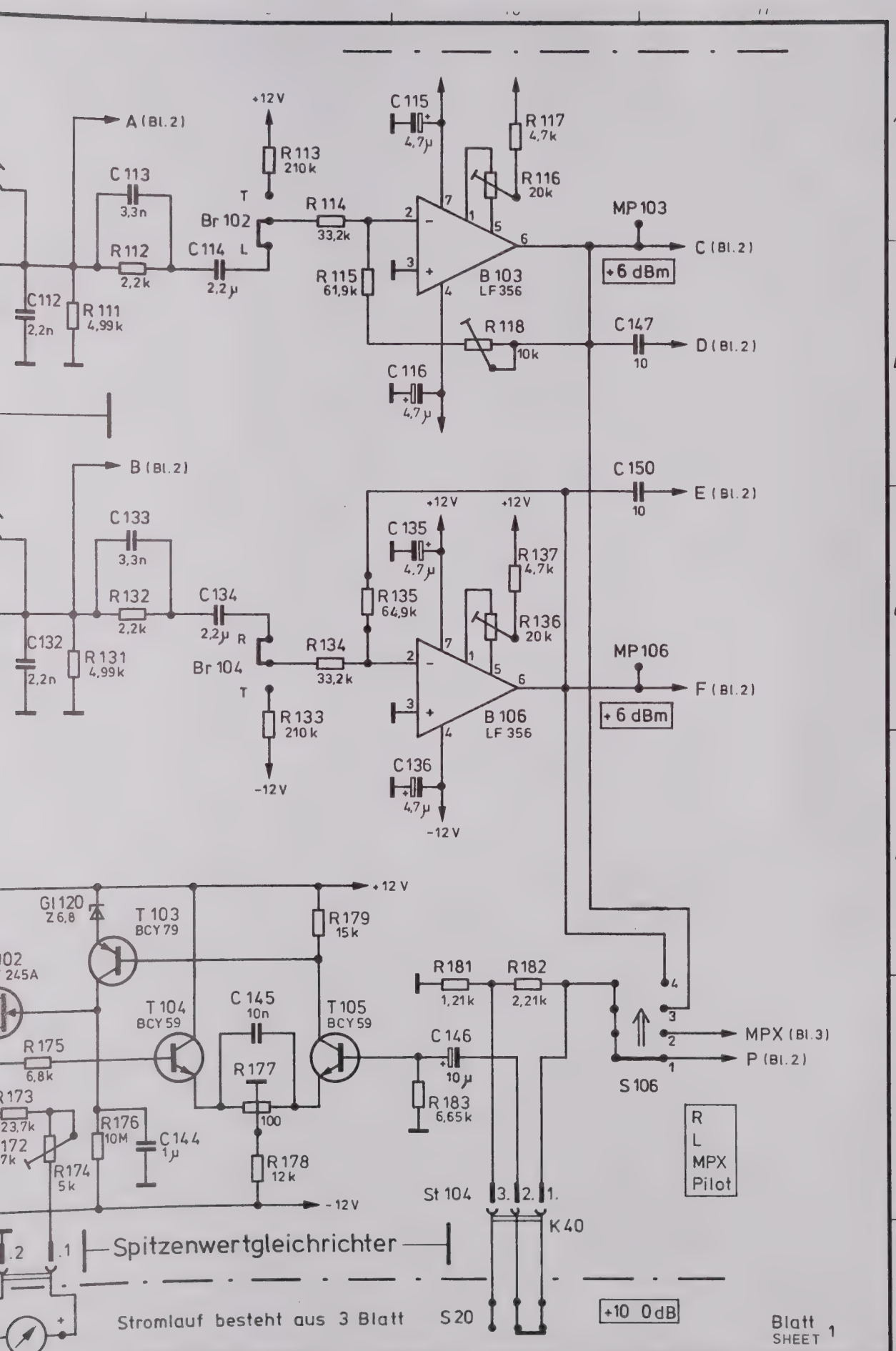
	Name	Datum
gezeichnet	Ba	11.78
bearbeitet	ST	11.78
geprüft		
normgepr.		

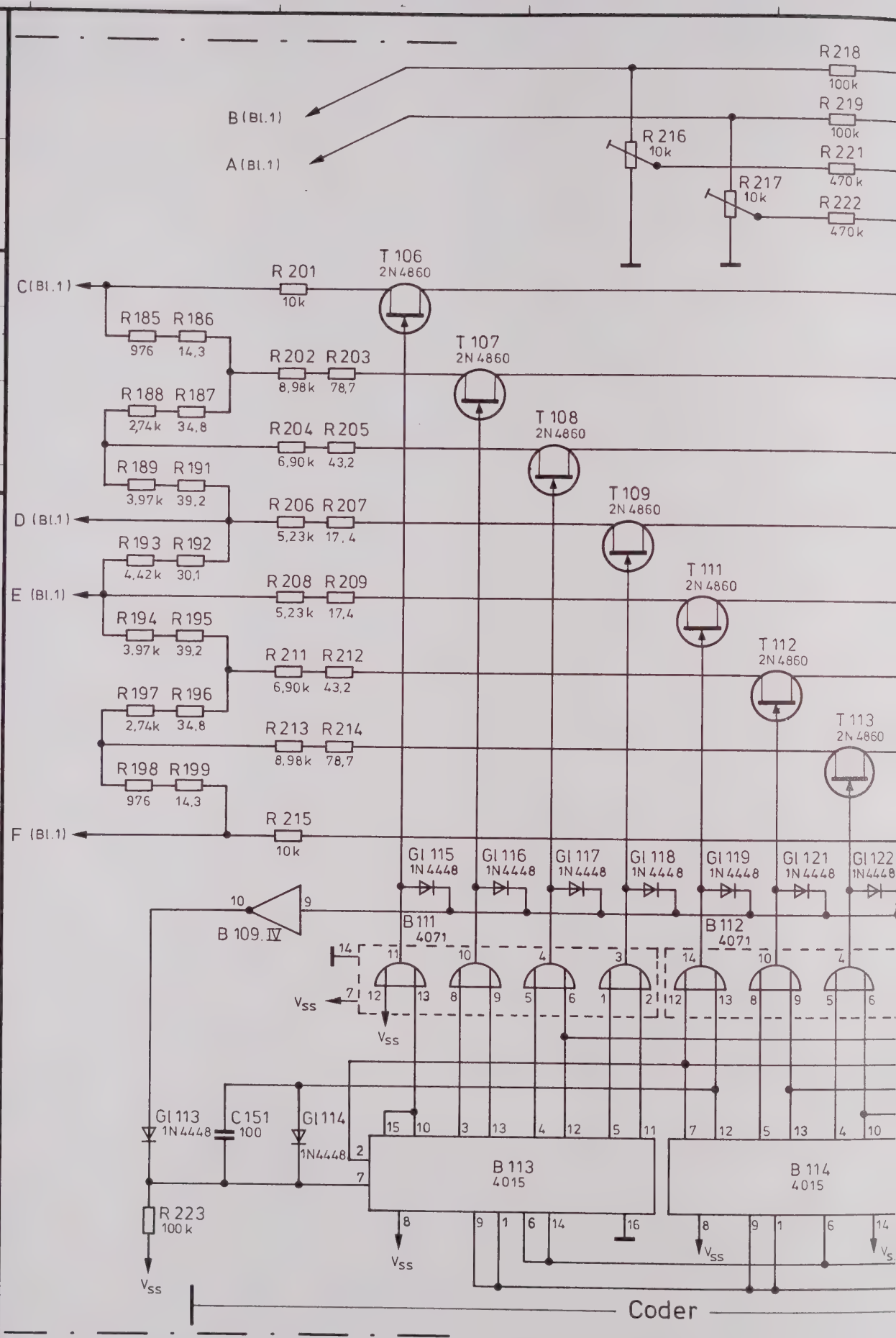
2 KGB

PF 095.4109

1 2 3 4


+12 V
-12 V
R105 22,1k
R106 100
R107 4,99k
MP101 +6dBm
C101 10n
C102 15n
Br101
Pre-Emph.
S103
B102 LF356
R108 5,49k
R109 3,01k
MP102 +6,5dBm
L101 34,7m
L102 25,4m
L103 19,8m
C104 470
C106 2,7n
C108 3,9n
C103 3,3n
C105 4,7n
C107 3,3n
C109 3,9n
15 kHz - Tiefpaß
C121 10n
C122 15n
Br103
R125 22,1k
R126 100
R127 4,99k
MP104 +6dBm
B105 LF356
R128 5,49k
R129 3,01k
MP105 +6,5dBm
L105 34,7m
L106 25,4m
L107 19,8m
C124 470
C126 2,7n
C128 3,9n
C123 3,3n
C125 4,7n
C127 3,3n
C129 3,9n
R158 2,2k
Amplitude
C137 4,7µ
C138 4,7µ
B107 LF 357
R154 100k
C139 100n
R156 1,8k
C141 220µ
R157 270Ω
R159 100k
R155 470Ω
T101 BF245A
R161 50k
R162 100k
R164 22k
GI111 1N4448
R165 100
C142 100µ
R166 2,7M
B108.I TL082
B108.II TL082
R167 47k
R168 47k
GI112 1N4448
C143 22µ
R169 7,15k
2,2V
MP107
R171 1,82k
R163 1,2M
St103
K30
J10
Sinusgenerator


A (Bl. 2)
+12 V
C 115
4,7µ
R 117
4,7k
R 113
210 k
R 116
20k
C 113
3,3n
T
R 114
33,2k
Br 102
MP 103
C (Bl. 2)
R 112
2,2k
C 114
2,2µ
L
2
7
1
5
6
3
4
B 103
LF 356
+6 dBm
C112
2,2n
R 111
4,99k
R 115
61,9k
R 118
10k
C 147
10
D (Bl. 2)
C 116
4,7µ
B (Bl. 2)
C 150
10
E (Bl. 2)
+12V
+12V
C 135
4,7µ
R 137
4,7k
C 133
3,3n
R 135
64,9k
R 136
20 k
R 132
2,2k
C 134
2,2µ
R
C132
2,2n
R 131
4,99k
Br 104
R 134
33,2k
MP 106
F (Bl. 2)
T
R 133
210 k
B 106
LF 356
+6 dBm
-12V
C136
4,7µ
-12V
+12 V
GI 120
Z 6,8
T 103
BCY 79
R 179
15k
R 181
1,21k
R 182
2,21k
4
3
2
1
MPX (Bl. 3)
P (Bl. 2)
S 106
T 104
BCY 59
C 145
10n
T 105
BCY 59
C 146
10 µ
R 175
6,8k
R 177
100
R 183
6,65k
R 176
10M
C 144
1µ
R 178
12 k
R 174
5k
-12 V
R
L
MPX
Pilot
St 104
3.
2.
1.
K 40
Spitzenwertgleichrichter
Stromlauf besteht aus 3 Blatt
S 20
+10 0dB
Blatt
SHEET 1
Stromlauf zu
Stereomeßcoder MSC 2
Z
Zeichn. Nr. 230.9314 S
reg. i.V. 230.9314
erste Z.



ROHDE & SCHWARZ · MÜNCHEN
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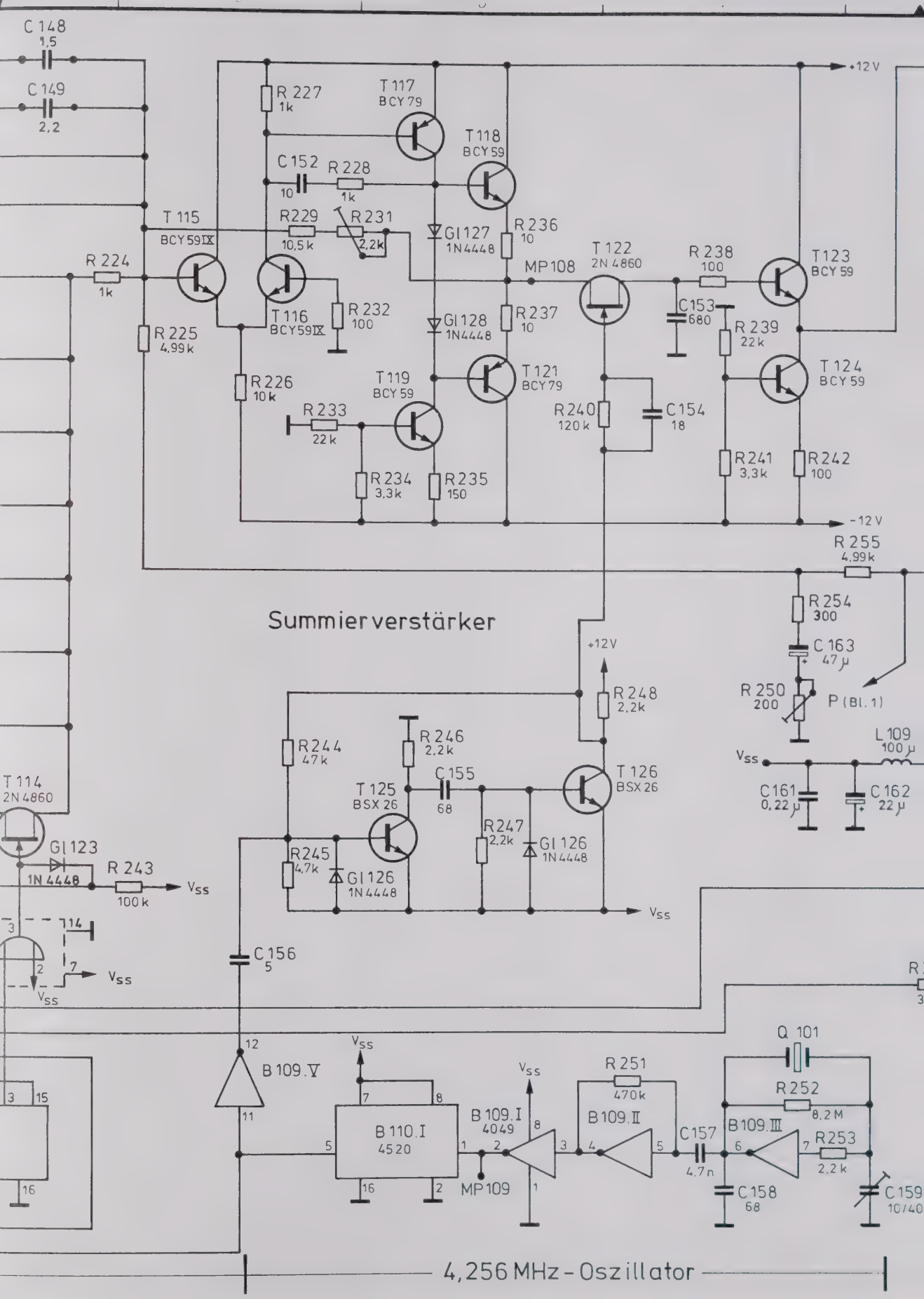
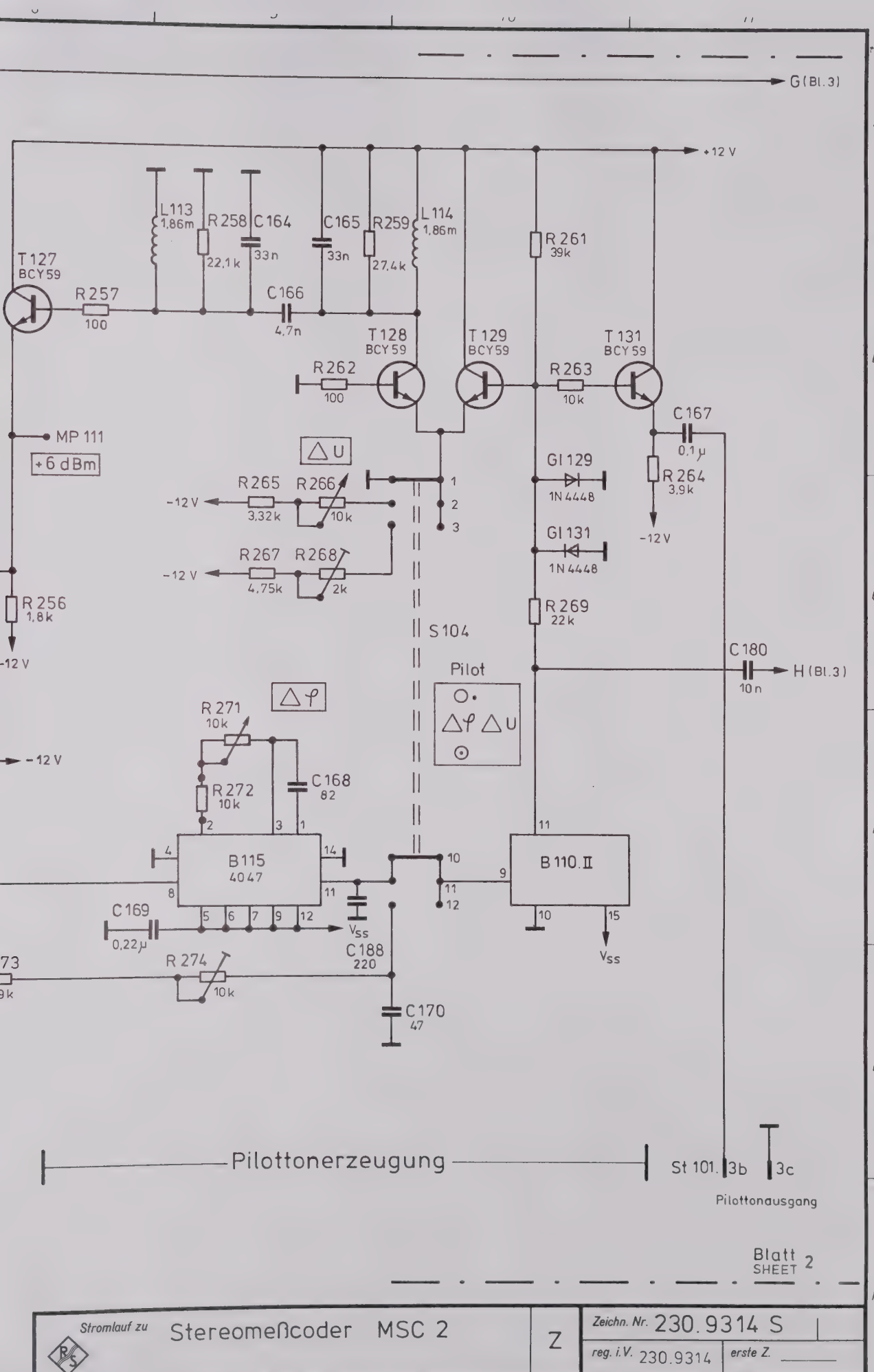
Zeichn.-Nr. 230.9314 S		Name
1FME	gezeichnet 11.78	Ba
	bearbeitet 11.78	ST
	geprüft	
	normgepr.	

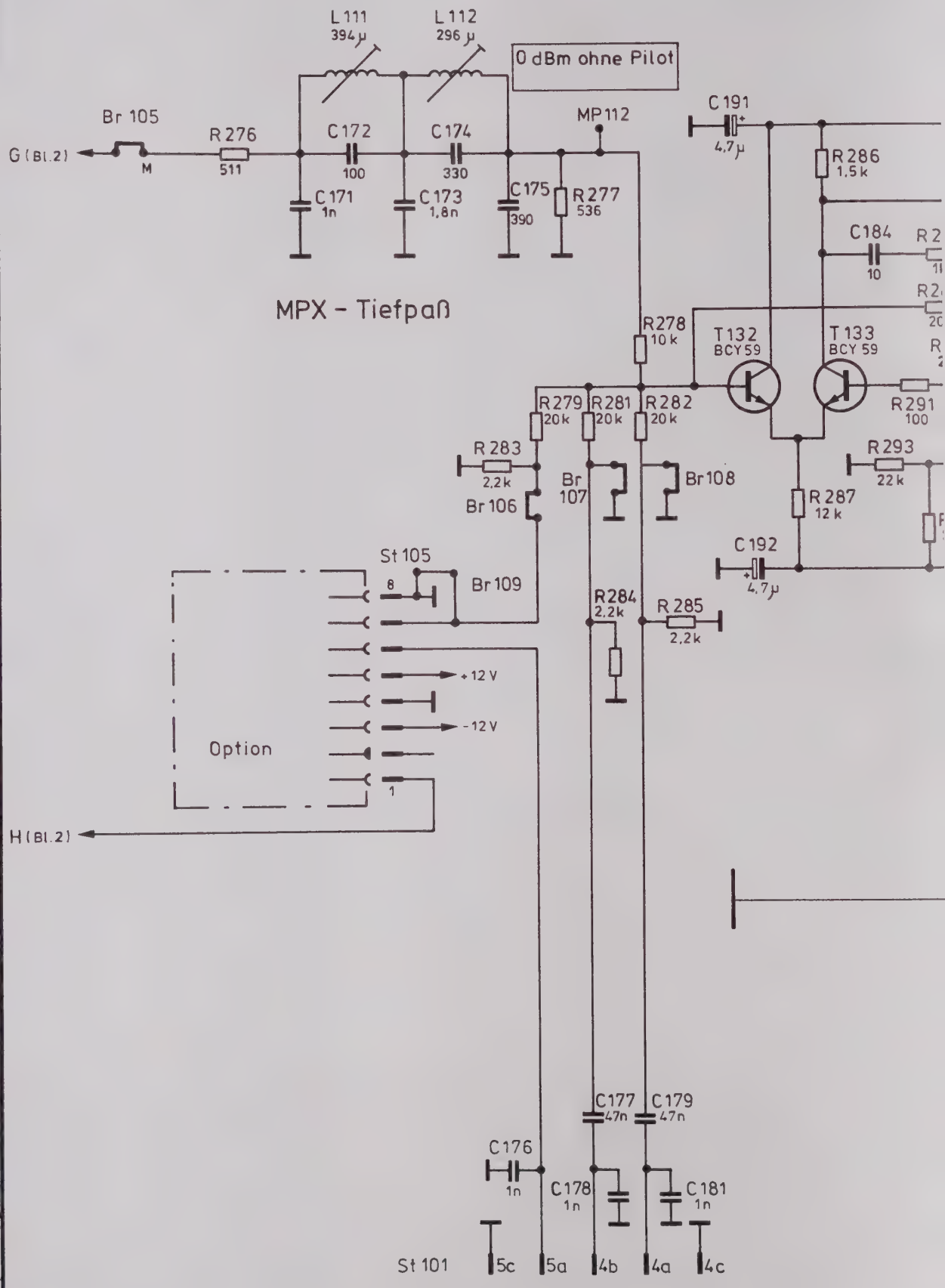
Änd.-zust.	Änd. Mittg Nr.	Datum	Name
A	26020	4.80	ST

PF 095.4109

1 2 3 4


C 148 1,5
C 149 2,2
R 227 1k
T 117 BCY 79
T 118 BCY 59
C 152 10
R 228 1k
T 115 BCY 59 IX
R 229 10,5 k
R 231 2,2k
Gl 127 1N4448
R 236 10
+12 V
R 224 1k
T 116 BCY 59 IX
R 232 100
MP 108
T 122 2N 4860
R 238 100
T 123 BCY 59
C 153 680
R 225 4,99 k
Gl 128 1N4448
R 237 10
R 239 22k
T 124 BCY 59
R 226 10k
T 119 BCY 59
T 121 BCY 79
R 233 22k
R 240 120 k
C 154 18
R 234 3,3k
R 235 150
R 241 3,3k
R 242 100
-12 V
R 255 4,99k
R 254 300
C 163 47 µ
Summierverstärker
+12V
R 248 2,2k
R 250 200
P (Bl. 1)
L 109 100 µ
R 244 47 k
R 246 2,2k
T 125 BSX 26
C 155 68
T 126 BSX 26
Vss
C 161 0,22 µ
C 162 22 µ
T 114 2N 4860
Gl 123 1N 4448
R 243 100 k
R 247 2,2k
Gl 126 1N 4448
R 245 4,7k
Gl 126 1N 4448
C 156 5
Q 101
R 252 8,2 M
B 109.V
B 110.I 4520
B 109.I 4049
B 109.II
R 251 470k
B 109.III
C 157 4,7 n
R 253 2,2 k
C 158 68
C 159 10/40
MP 109
4,256 MHz - Oszillator


G (Bl. 3)
+12 V
L113 1,86m
R258 22,1k
C164 33n
C165 33n
R259 27,4k
L114 1,86m
R261 39k
T127 BCY59
R257 100
C166 4,7n
T128 BCY59
T129 BCY59
T131 BCY59
R262 100
R263 10k
C167 0,1µ
MP 111
+6 dBm
△U
R265 3,32k
R266 10k
-12 V
R267 4,75k
R268 2k
Gl 129 1N4448
Gl 131 1N4448
R264 3,9k
-12 V
R256 1,8k
-12 V
S104
R269 22k
C180 10n
H (Bl. 3)
Pilot
△φ △U
△φ
R271 10k
-12 V
R272 10k
C168 82
B115 4047
B110.II
C169 0,22µ
Vss
C188 220
R274 10k
C170 47
Vss
Pilottonerzeugung
St 101. 3b 3c
Pilottonausgang
Blatt SHEET 2
Stromlauf zu
Stereomeßcoder MSC 2
Z
Zeichn. Nr. 230.9314 S
reg. i.V. 230.9314
erste Z.



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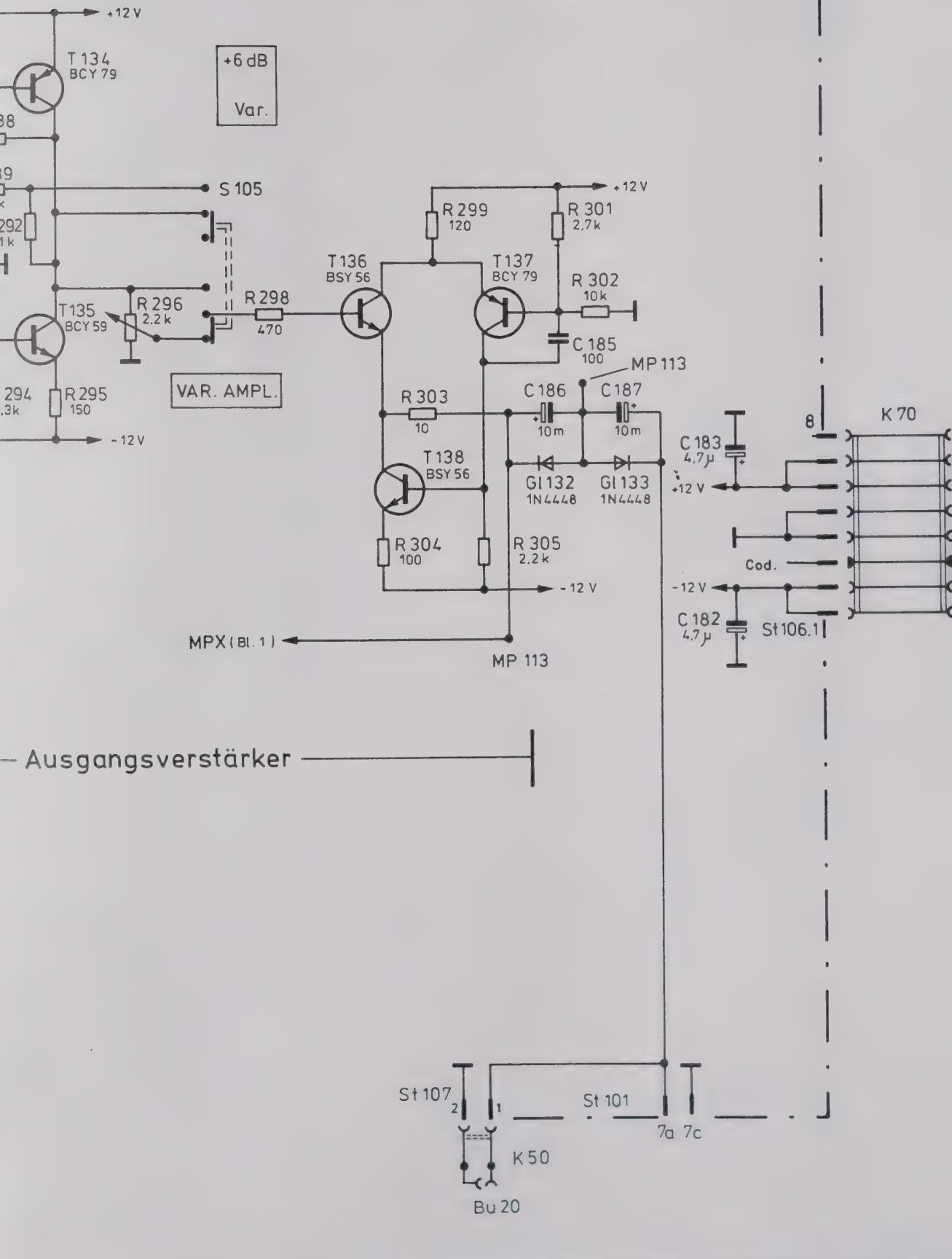
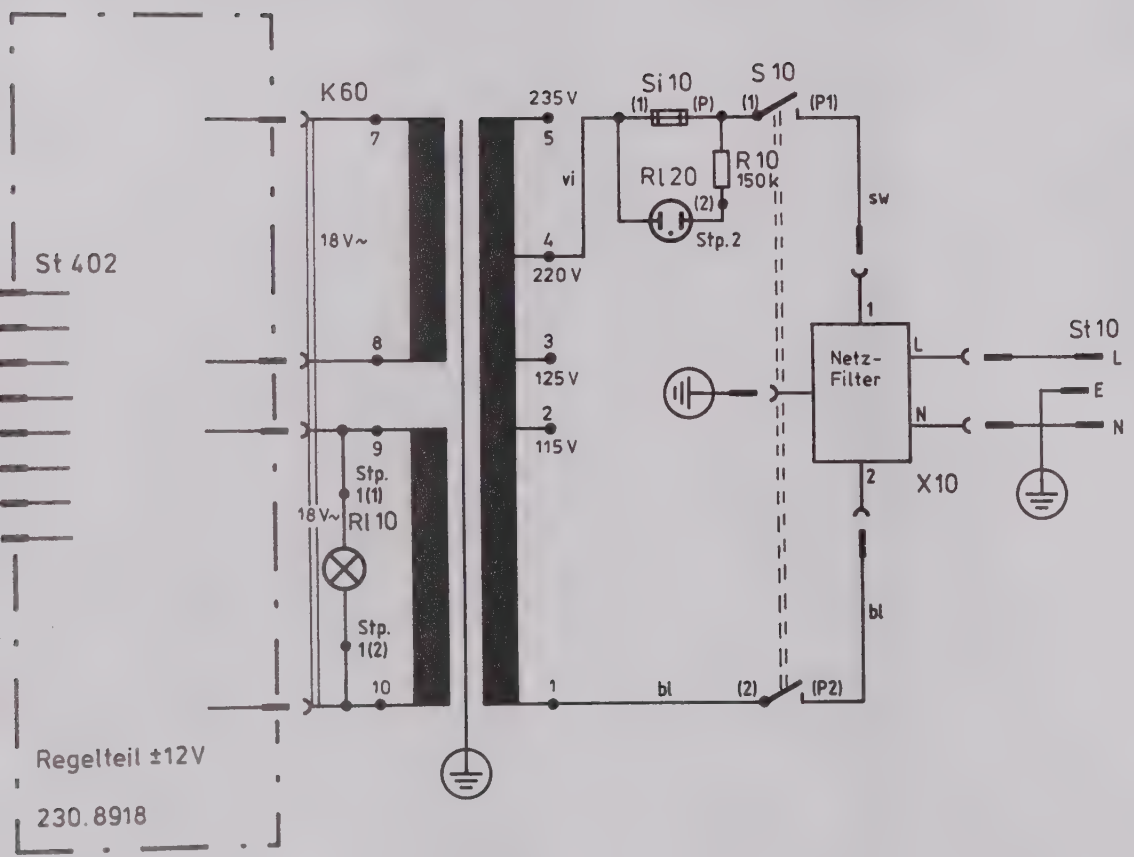
ROHDE & SCHWARZ · MÜNCHEN

Zeichn.-Nr. 230.9314 S	Datum	Name
2 KGB		
gezeichnet	11.78	Ba
bearbeitet	11.78	ST
geprüft		
normgep.		

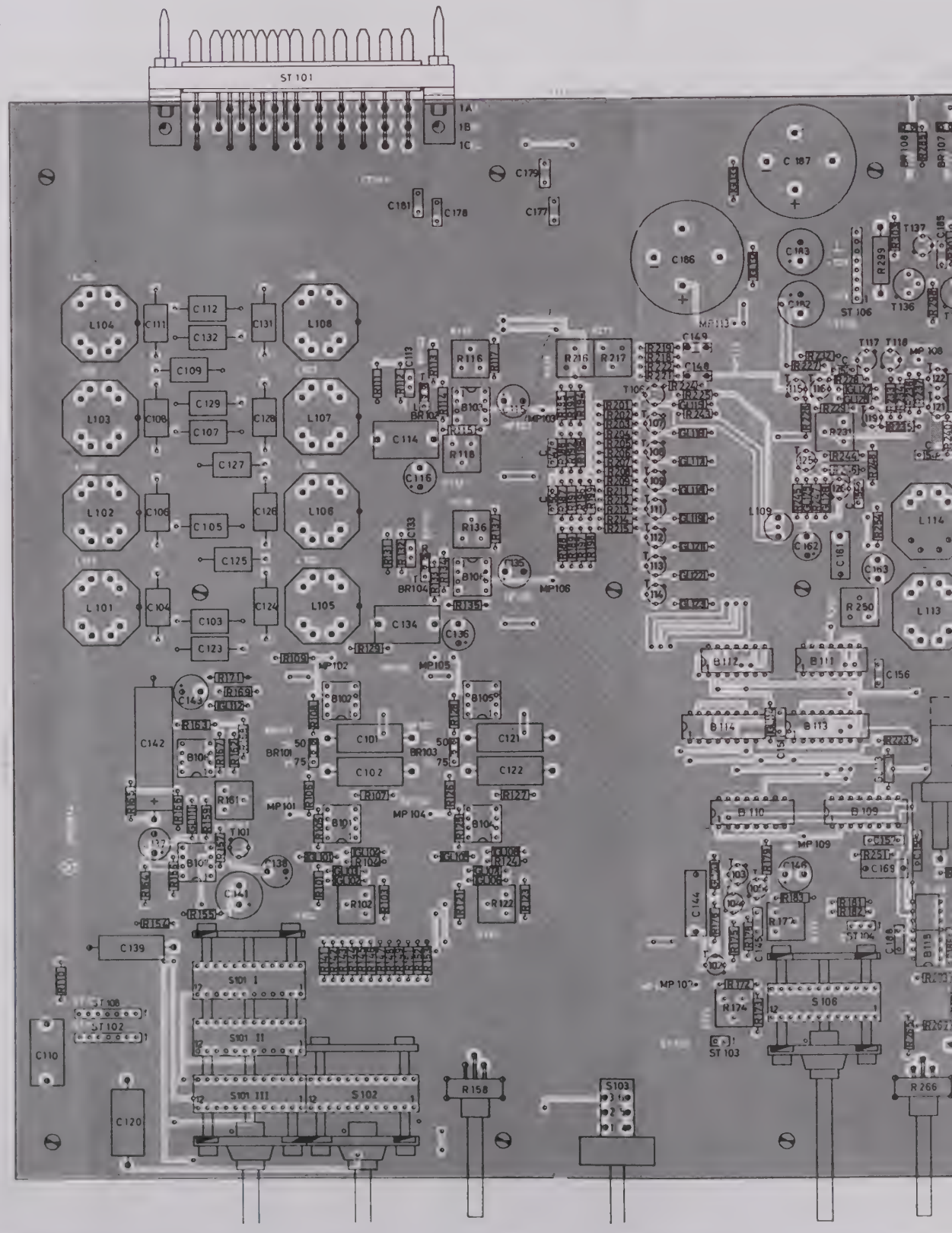
zust.	Nr.	Datum	Name
A	26020	4.80	ST
B	31249	11.83	DP
C	41421	2.89	DP


+12 V
T 134
BCY 79
+6 dB
Var.
S 105
R 299
120
R 301
2,7k
+12 V
T136
BSY 56
T137
BCY 79
R 302
10k
T135
BCY 59
R 296
2,2 k
R 298
470
C 185
100
MP 113
VAR. AMPL.
R 303
10
C 186
10m
C 187
10m
K 70
8
C 183
4,7µ
+12 V
T 138
BSY 56
Gl 132
1N4448
Gl 133
1N4448
R 295
150
- 12 V
R 304
100
R 305
2,2 k
- 12 V
Cod.
- 12 V
C 182
4,7µ
St 106.1
MPX (Bl. 1)
MP 113
Ausgangsverstärker
St 107
2
1
St 101
7a 7c
K 50
Bu 20



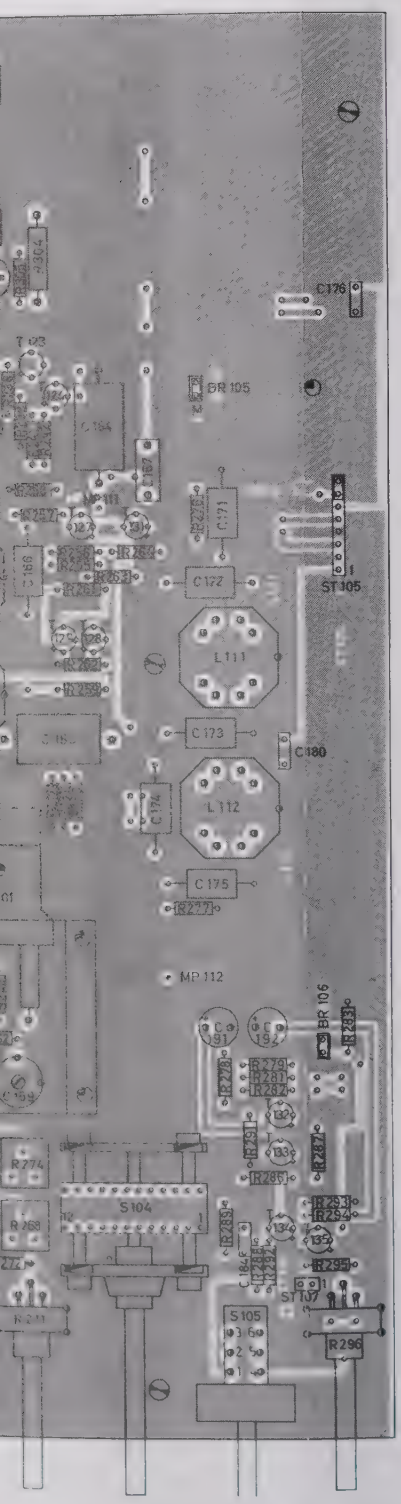
Blatt 3
SHEET

Stromlauf zu Stereomeßcoder MSC 2	Z	Zeichn. Nr. 230.9314 S
		reg. i.V. 230.9314 / erste Z.



r diese Unte
wir uns alle

SO Projektion
Methode E



Ansicht und Leitungsfuhrung Bauteilseite
View of tracks on component side

(BR 107 ⟶ BR 106 in DV 4)

0 1 2 3
ZENTIMETER

D	41433	04.89	DP	Maße ohne Toleranzangabe	Maßstab 1 1
E	42859	10.89	DP		Halbzeug Werkstoff
				2KGB Bearb 04.89 DP	Benennung STEREOMESSCODER Z
				ROHDE & SCHWARZ MSC2	230.9614 2
					230.9314 V erste Z 230.9314

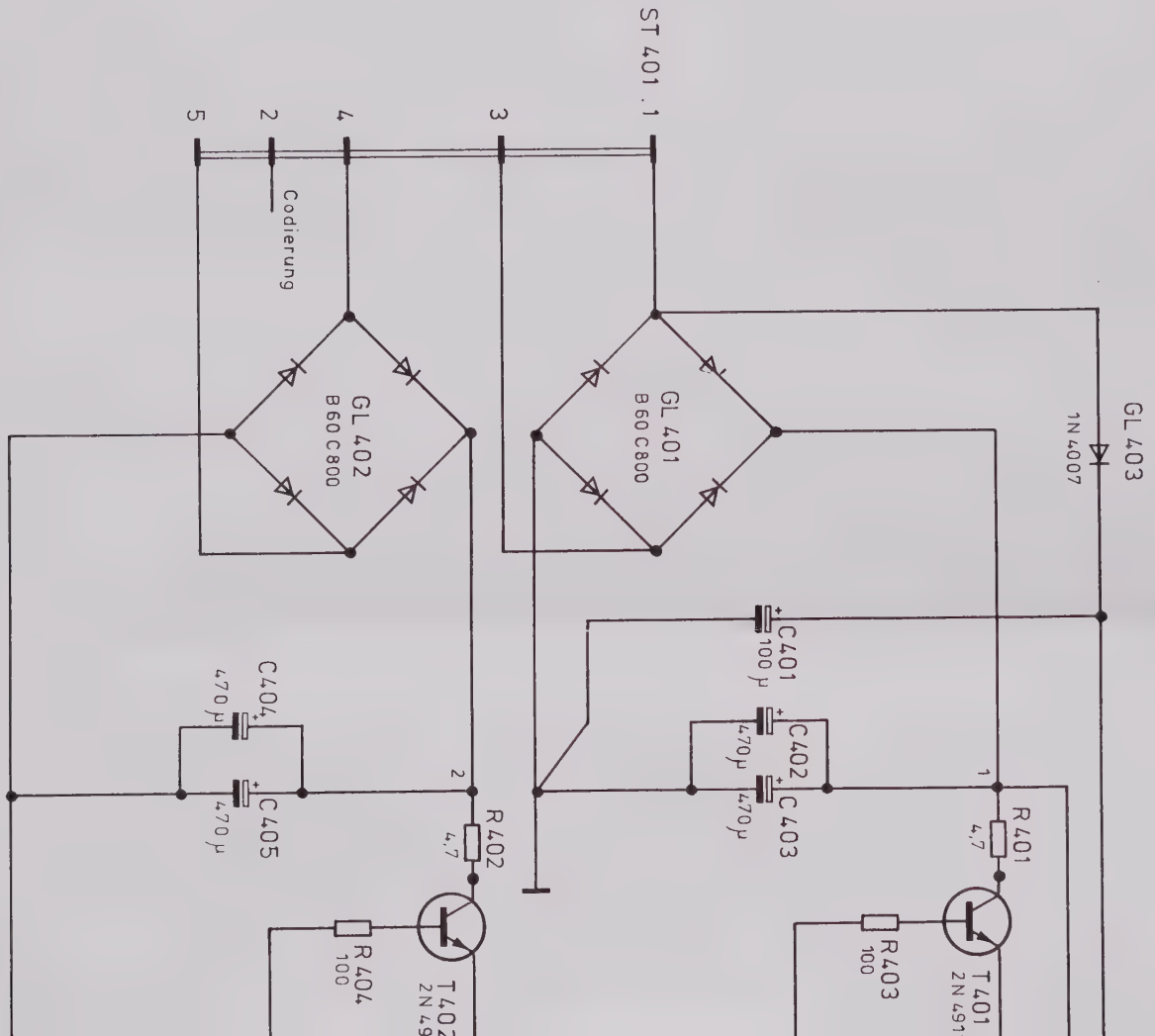
1 FME	Datum	Name	And zust	And Mittlg Nr	Datum	Name
gezeichnet	10.78	Ba	A	28756	04.82	Ko
bearbeitet	10.78	ST				
geprüft						
normgepr						

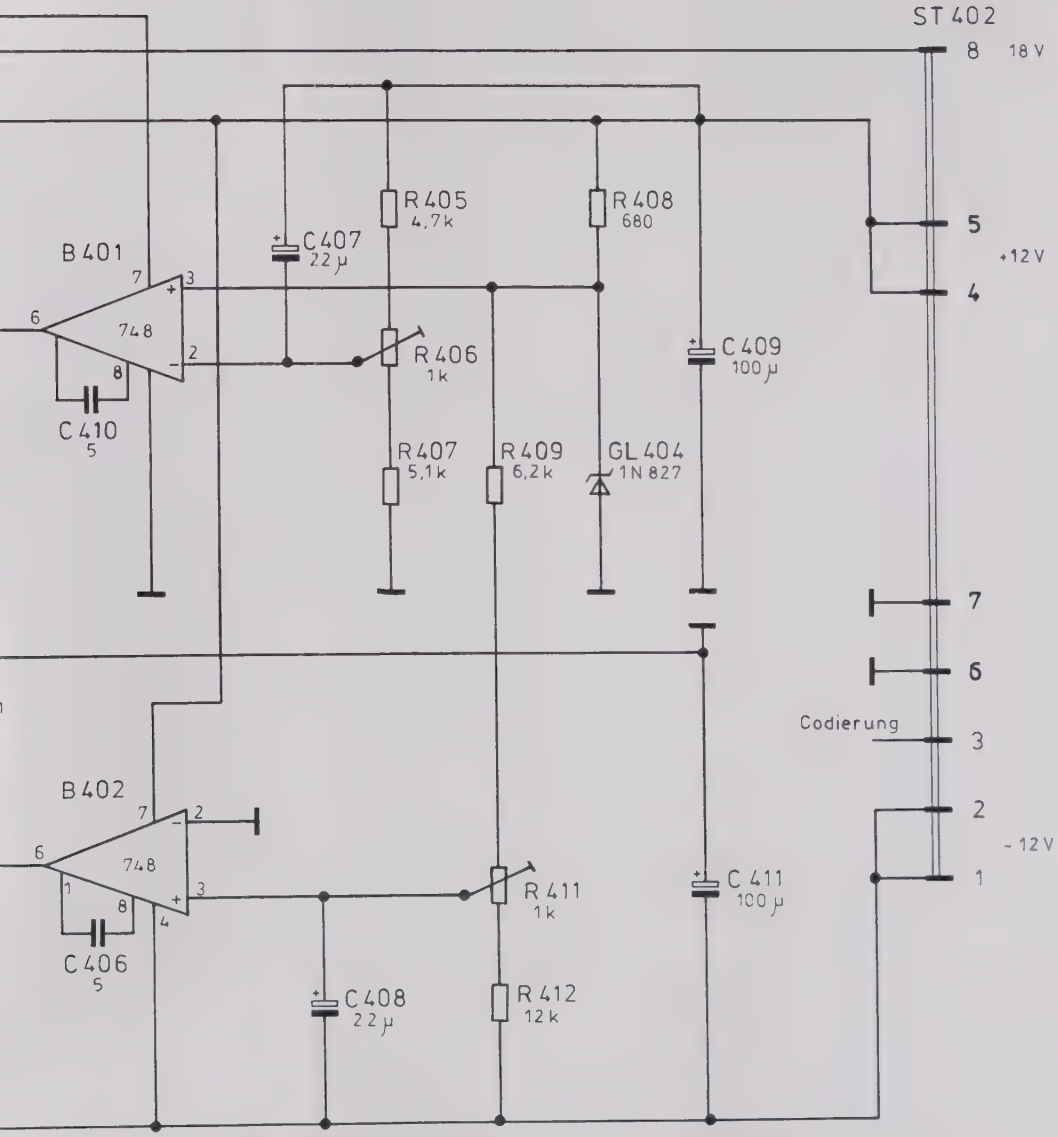
Diese Zeichnung ist unser Eigentum. Vervielfältigung, unbefugte Verwertung, Mitteilung an andere ist strafbar und schadenersatzpflichtig.

ROHDE & SCHWARZ · MÜNCHEN

Änd · zust	Änd. Mittlg. Nr.	Datum	Name

Änd · zust.	Änd. Mittlg. Nr	Datum	Name





Stromlauf zu

Regelteil +12 V, -12 V

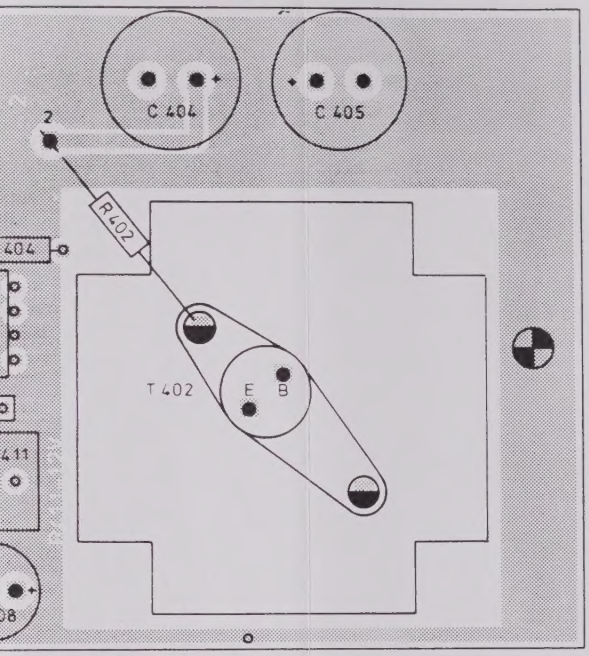
Z

Zeichn. Nr. 230.8918 S

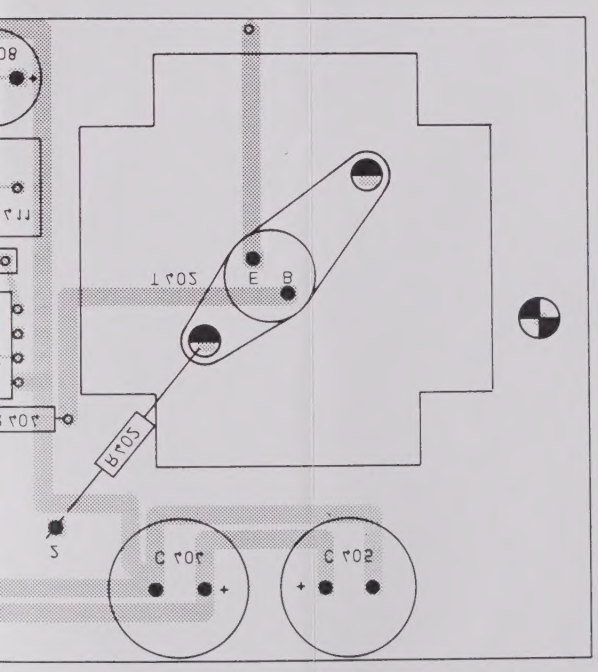
reg. i.V. 230.8518V | erste Z. 230.8518

C 402
C 403
GL401
GL402
ST 401
R401
C 401
GL403
R 403
R 408
GL404
B 401
R 407
R 406
R 405
C 410
C 407
R 409
C 409
R 412
C 411
B E
T 401
ST 402
220-88-13

ST 402
C 402
C 403
C 401
R 401
T 401
B E
R 403
R 408
GL 404
B 401
R 407
R 406
R 405
C 410
C 407
R 409
C 409
R 412
C 411
GL 401
GL 402
GL 403
ST 401



Ansicht und Leitungsfuhrung Bauteilseite
View of tracks on component side



Ansicht und Leitungsfuhrung Lotseite
View of tracks on solder side

0 1 2 3
ZENTIMETER

A	31819	384	DP	Maße ohne Toleranzangabe		Maßstab 2 : 1	
						Halbzeug Werkstoff	
				1FM	Tag	Name	Benennung Regelteil ± 12 V
				Bearb	17.7.78	Nk	Z
				Gepr			
				Norm			
				ROHDE & SCHWARZ MÜNCHEN			Zeichn.-Nr 230.8918
							Blatt-Nr 2
And Zust	Änderungs-Mitteilung	Tag	Name	zu Gerät GC 003			teg. 230 8518 V erste Z 230 8518

Translations for Drawings and Diagrams

Ausgangsverstärker	Output amplifier
Codierung	Coding
Frontplatte	Front panel
Generatorausg.	Generator output
Gestell	Rack
15-kHz-Tiefpaß	15-kHz lowpass filter
L-Eingang	L input
4,256 MHz-Oszillator	4.256-MHz oscillator
MPX-Tiefpaß	MPX lowpass filter
Netz	AC supply
Netzfilter	Line filter
Pilotamplitude	Pilot amplitude
Pilotphase	Pilot phase
Pilottonausg.	Pilot output
Pilottonerzeugung	Pilot-tone generation
Regelteil	Power supply
R-Eingang	R input
Sinusgenerator	Sinewave generator
Spitzenwertanzeige	Peak indication
Spitzenwertgleichrichter	Peak rectifier
Stereomeßcoder MSC 2	Standard Stereocoder MSC 2
Stromlauf besteht aus 3 Blatt	Circuit diagram consists of 3 sheets
Summierverstärker	Summing amplifier
Verkehrsfunk	Traffic radio
Wahlschalter	Selector
Zusatzeingang	Additional-signal input